AFCRL-818

AREOGRAPHIC COORDINATES FOR 1958

GERARD DE VAUCOULEURS

Harvard College Observatory
Cambridge 38, Massachusetts

SCIENTIFIC REPORT NO. 4

ARDC Contract AF19(604)-7461

August, 1961

Prepared for
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES
AIR FORCE RESEARCH DIVISION
AIR RESEARCH AND DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
BEDFORD, MASSACHUSETTS

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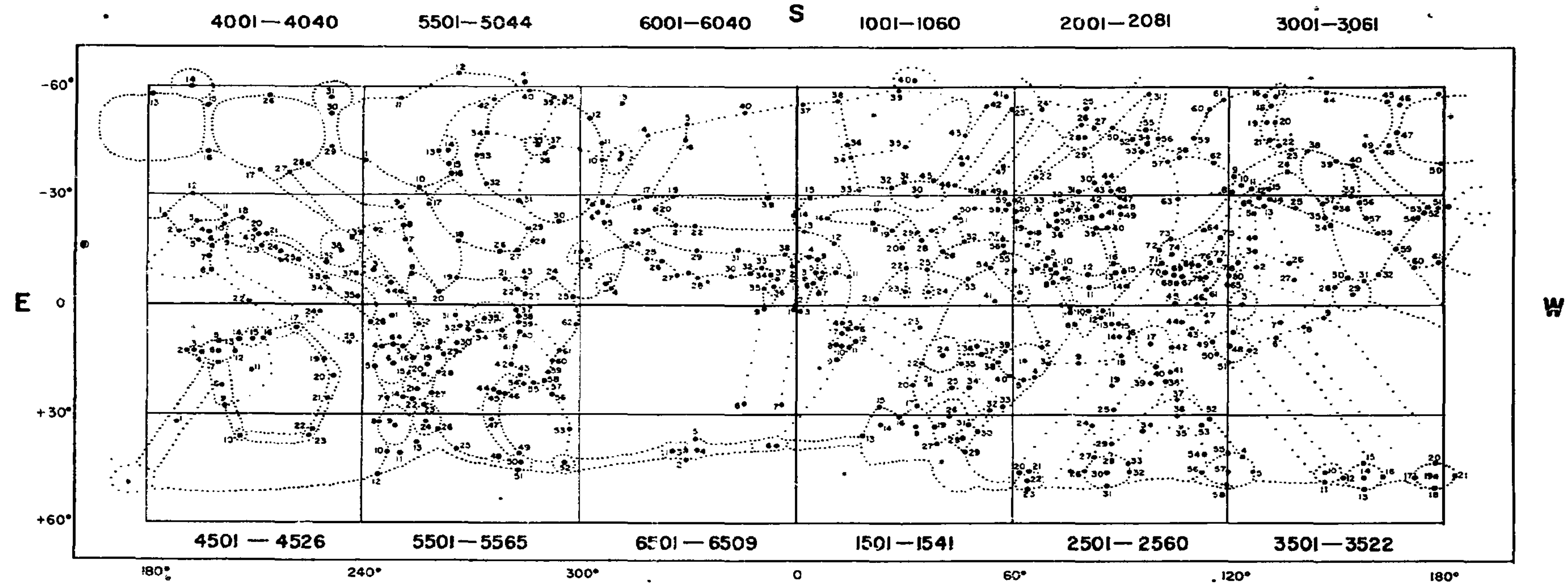
CONTENTS

TABLES

FIGURES AND MAP



INDEX MAP FLAGSTAFF 1958

ABSTRACT

Areographic coordinates of 546 points of the surface of Mars derived from 2321 measurements on 32 drawings made at Lowell Observatory in October and November 1958 are listed. Longitudes are corrected for phase effect. Probable errors are of the order of 1° or 60 km on Mars. Comparisons are made with longitudes derived from transit observations in 1939, 1941, and 1958. Reduction constants to a system of absolute longitudes are given.

I. INTRODUCTION

The opposition of Mars in 1958 was observed by the author with the 24-inch refractor of Lowell Observatory, Flagstaff, Arizona. The expedition was supported by the "Planetary Atmospheres" Project of Harvard Observatory under contract No. AF19(604)-3074 with the Air Force Cambridge Research Center. The general results of the expedition have been described in previous reports (de Vaucouleurs 1959, 1960) to which the reader is referred for details of the observational circumstances. Altogether 32 carefully positioned drawings of Mars were secured between October 4 and November 22, 1958 with the 24-inch refractor generally diaphragmed to 18 to 21 inches and magnifications of 350 x to 550 x. Reproductions of the drawings are given in (de Vaucouleurs 1959).

The areographic coordinates of surface and atmospheric details were measured on these drawings by Mr. R. Wright at Harvard Observatory in 1959-60. The method of measurement consists in superimposing on the drawing orthographic coordinates grids on glass. The grids were carefully drawn on a large scale (200 mm) for each 2 degrees of inclination by Dr. C. S. Yü, Hood College, Maryland and reduced photographically to the size of the drawings (63 to 71 mm). The direction of the axis of rotation was determined by the method originally described by G. Fournier (1913) and used also by the author for the 1939 opposition (de Vaucouleurs

1948). In brief, the proper orientation of the grid is found 1) by plotting on each drawing the successive positions of the center of the disk on adjacent drawings of the series; these positions determine the parallel of latitude D_0 where the Earth transits at the zenith, 2) rotating the orthographic grid having the correct inclination, i.e. closest to the ephemeris value, until its central parallel gives the best fit of the successive center points (Figure 1). In a few cases where the central parallel was poorly defined by the observations, the determination of the rotation axis was assisted by considering the location of the small south polar cap, the center of which has well-known areographic coordinates (long.: 30°, lat.: -83°).

II. MEASUREMENTS AND REDUCTION

Altogether 2321 measurements of 546 points were made on the 32 drawings. The coding of the points measured and their identification are given in Table 1 and on the outline map No. 1. For easy reference to the finding list of "Areographic coordinates 1909-1954" (de Vaucouleurs and Wright 1961) the "Master List" number for the visual points used in that paper is also listed in Table 2 which gives the provisional mean areographic coordinates derived from the present material for 546 points of the surface of Mars. These coordinates are "provisional" only to the extent that minor revisions may be introduced in the future in connection with a general reduc-

10°

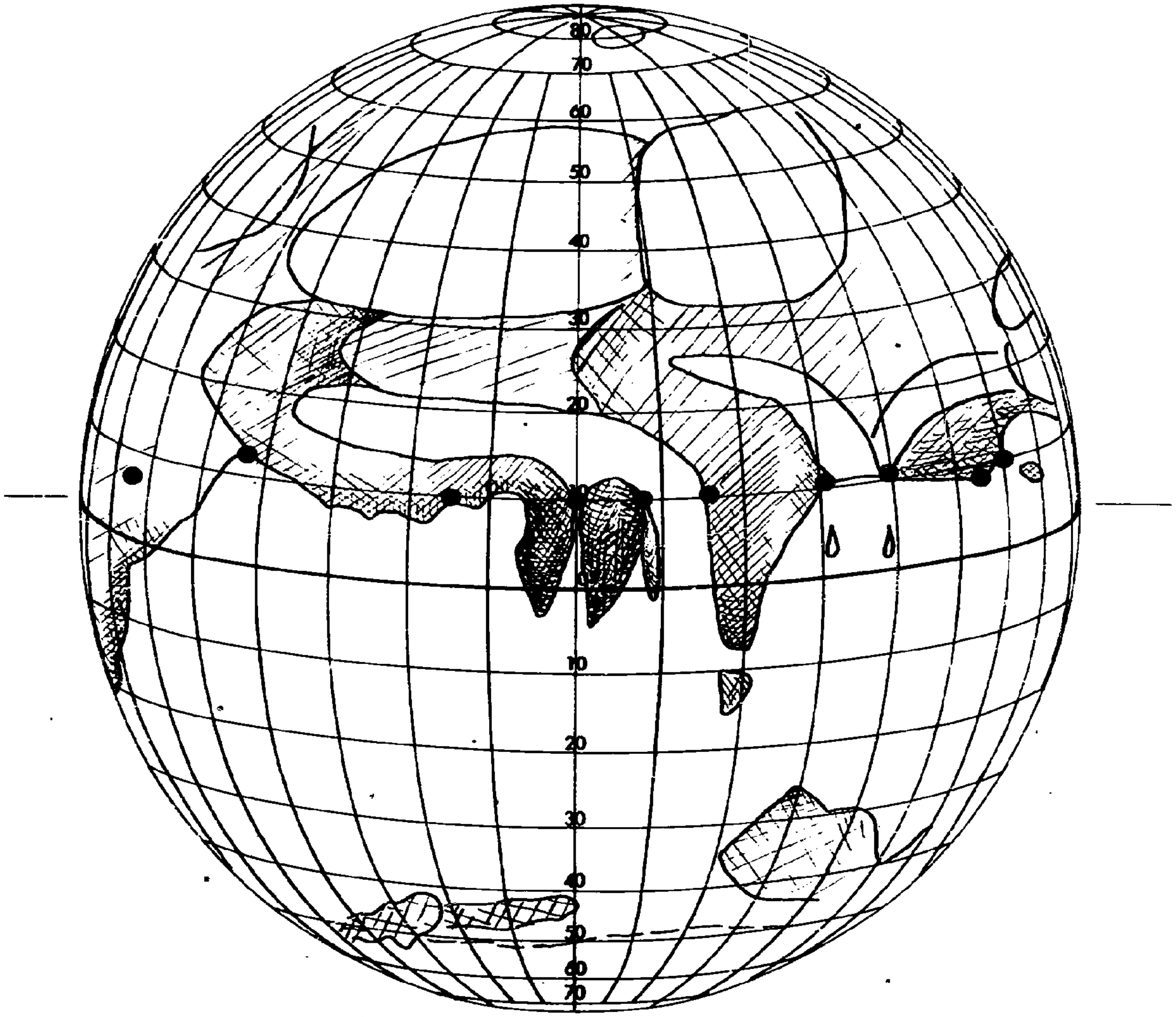


FIG. 1

tion of the 1909-1954 data and that slight adjustments in the weighting system may be made; no large changes are expected as a result. The present values are second-approximation data resulting from calculations carried out with the IBM 704 computer of the Jet Propulsion Laboratory, California Institute of Technology, Pasadena. I am indebted to Drs. A. R. Hibbs and R. Elmer for this most valuable contribution; the program was in the hands of Mr. C. Seafeldt. The raw data were transferred to punched cards by Mrs. O. Kojan at Harvard Observatory. It is the first application of an electronic computer to the reduction of areographic coordinates and a much more thorough allowance could be made for systematic effects, weights and other factors than was previously possible. Table 8 gives as an example the output of the machine for a typical first-class point (No. 2001 = ML No. 20 = Juventae Fons).

An outline of the reduction program is as follows:

a. Measured coordinates. For each point the latitude was directly read off the orthographic grid to the nearest degree; the longitude was given by

$$\lambda = \omega + \Delta \lambda$$

where ω is the longitude of the central meridian derived from the American Ephemeris for the middle of the 4 to 6 minutes period during which the main details were sketched in to position the drawing. In addition the "quality" Q of the point in longitude and latitude was estimated by the measurer, on a scale of 1 for a well-defined point, to 3 for a poorly defined point.

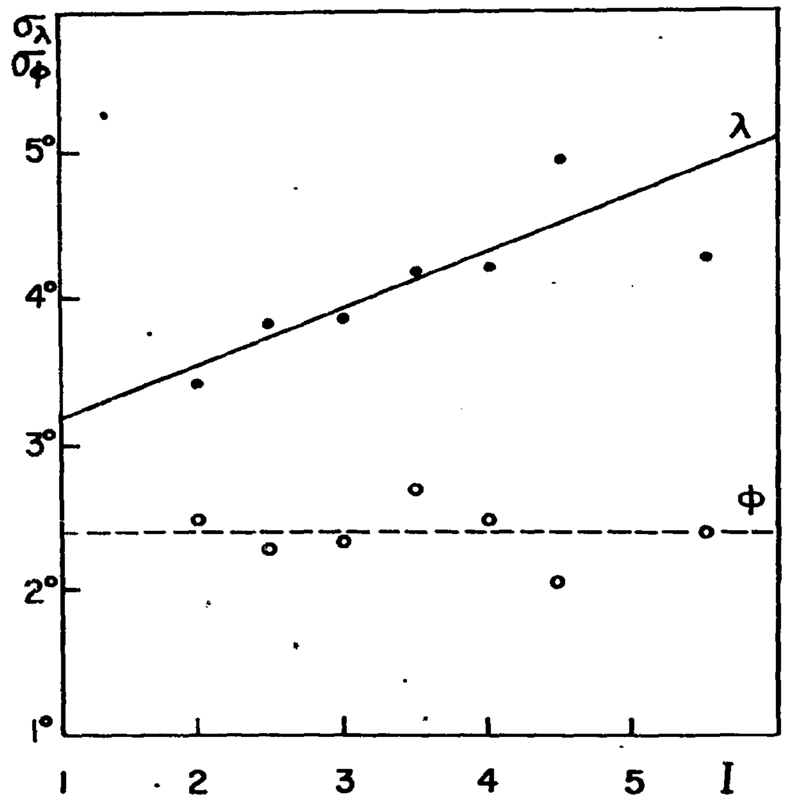
e. Adopted values. The adopted values are the weighted means of λ' and ϕ'. The mean values of Q_λ and Q_ϕ are unweighted. From the residuals

$$\delta_\lambda = \lambda' - \overline{\lambda'} \qquad \delta_\phi = \phi' - \phi$$

the standard errors of one observation of unit weight and the probable errors of the mean values were computed in the usual manner. The standard error for each drawing and for several intervals of image quality ("seeing"), point quality ("definition") and heliographic latitude were also computed as shown in Tables 5 to 7.

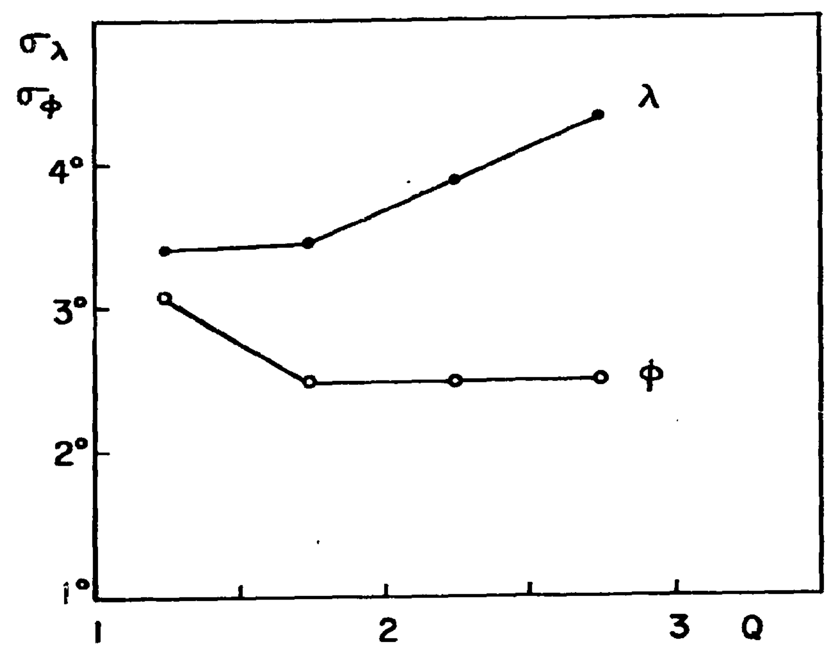
III. DISCUSSION

The standard error of the longitude measurements increases as expected when the quality of the telescopic seeing decreases (I increases from 2 to 5), and when the quality of point definition decreases (Q increases from 1 to 3), but, unaccountably, it seems to be independent of either for the latitude measurements (Figure 2). The standard error increases for both coordinates as a function of ($\phi - D_o$) as expected (Figure 3) and in agreement with the results of Fournier (1913). The minimum standard error for a point of unit weight measured near the center of the disk ($\phi - D_o = -10°$ in 1958) is about 3° in longitude, 2° in latitude. The probable errors of the adopted mean coordinates of well-defined and well-observed points (i.e., observed at least three times) in Table 2 are of the order of ± 1°.0 in longitude, and ± 0°.5 in latitude. However, longitudes



σ_λ
σ_ϕ
5°
4°
3°
2°
1°
λ
φ
1
2
3
4
5
I

2a



σ_λ
σ_ϕ
4°
3°
2°
1°
λ
φ
1
2
3
Q

2b

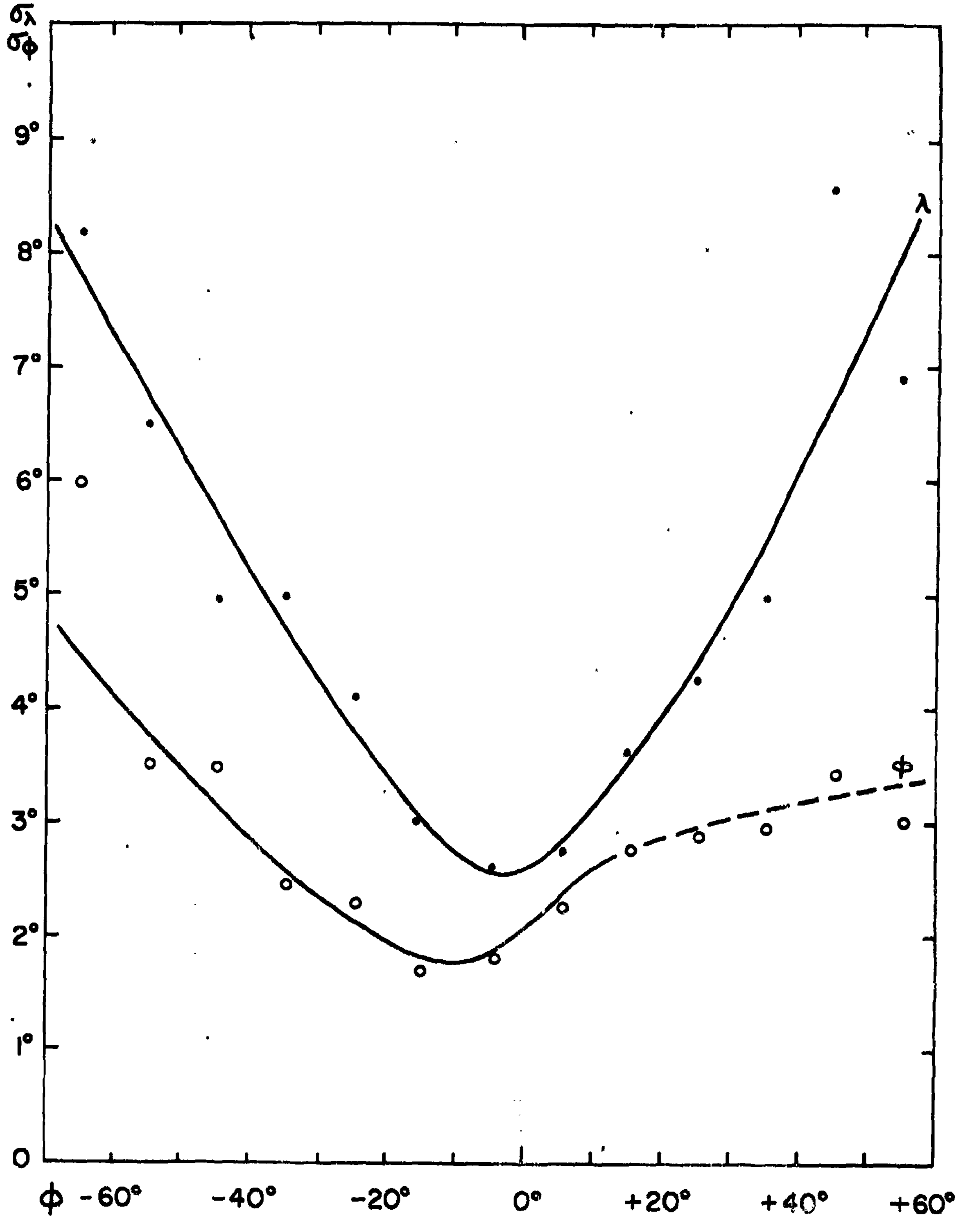


FIG. 3

can be corrected for systematic errors from internal evidence because any given point can be observed both before and after opposition, and also East and West of the central meridian; latitudes cannot be so corrected, because the inclination of the globe is essentially constant during any given opposition; a comparison of several observers and several oppositions when the planet was seen at widely different presentations (i.e., different D_o) is necessary to evaluate the latitude errors. This will be done later through an inter-comparison of all the areographic coordinates data from 1909 to 1958.

IV. COMPARISON WITH TRANSIT OBSERVATIONS

During the oppositions of 1939, 1941, and 1958 the times of transits of reference points across the central meridian were determined by the writer with the 8-inch refractor of the Peridier Observatory, Le Houga, France (1939, 1941) and with the 24-inch refractor of Lowell Observatory.

The observed or interpolated transit times were corrected where required for the inclination of the apparent meridian to the true meridian. The apparent meridian is defined by the center of the south polar cap and the apparent center of the disk; the correction is given by formulae (3) and (5) of Ashbrook (1953) or by an equivalent approximate procedure. The correction for phase defect was not applied because an approximate allowance for it was made during the observations and a check of the results shows no significant dependence on phase angle (see below). In 1939 and 1941 the location of

the apparent meridian with respect to the topographical features was marked at arbitrarily observed times and the transit times of selected points were then derived by interpolation; in 1958 the transits of pre-selected points were observed by the (t!) technique described by Ashbrook (1953).

The observational data and adopted corrections are summarized in Table 9. The scale of image quality ("seeing") is from 1 = excellent, to 5 = very poor. The derived longitudes are listed in Table 10 where the identification numbers refer to the 1958 index map No. 3 supplemented by descriptions. Values in parenthesis, derived by extrapolation, and values observed at phase angles greater than 30° are given lower weight. There are only 4 points in common to the transits of 1941 and 1958 (No. 1001, 1002, 4012, 4506); the weighted mean difference

$$\Delta\lambda\ (1958 - 1941) = -\,0\overset{\circ}{.}25 \pm 0\overset{\circ}{.}30\ (\text{p.e.})$$

is not significant. The average difference (unweighted, excluding 1941 July 17) between multiple determinations of the same point in the same year is $\pm\,2\overset{\circ}{.}67$ (n = 28) or $\pm\,2\overset{\circ}{.}38$ (n = 27, rejecting the outstanding difference $10\overset{\circ}{.}4$ for point No. 4035). This corresponds to a probable error of about $1\overset{\circ}{.}5$ per determination. Ashbrook (1953) quotes values of the order of 1° to 3° for several observers.

Comparison with the longitudes derived from the drawings of 1958 leads to the following systematic differences in the sense (drawing 1958 - transits):

transits of 10 points, 1958 = $-\,0\overset{\circ}{.}25 \pm 0\overset{\circ}{.}35$ (p.e._1 = $1\overset{\circ}{.}12$)

transits of 31 points, 1941 = $-\,1\overset{\circ}{.}41 \pm 0\overset{\circ}{.}41$ (p.e._1 = $2\overset{\circ}{.}30$)

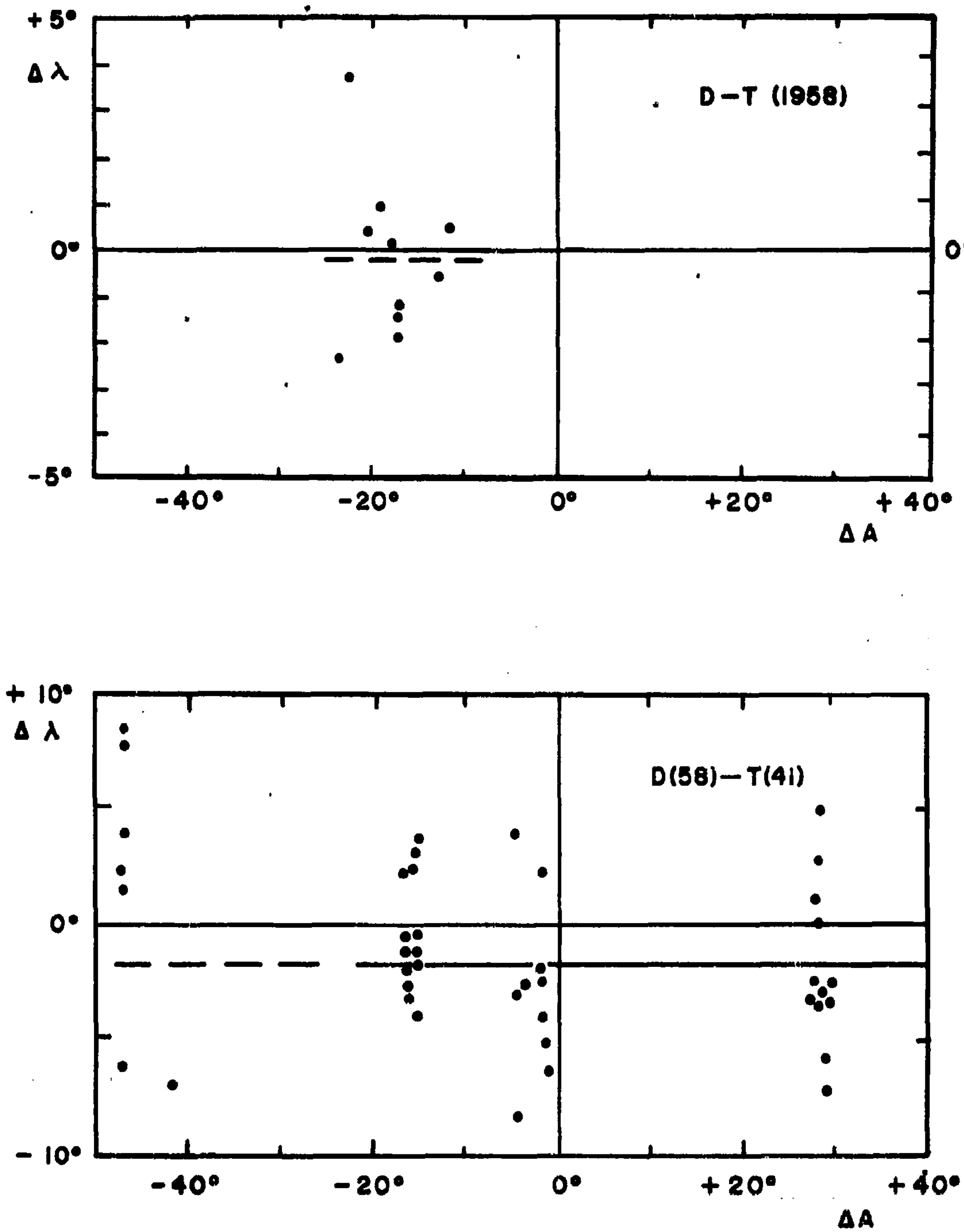


FIG. 4

or restricting to 8 good points

$= - 0\overset{\circ}{.}35 \pm 0\overset{\circ}{.}54$ (p.e.$_1$ $= 1\overset{\circ}{.}53$)

transits of 9 points, 1939 $= - 0\overset{\circ}{.}38 \pm 1\overset{\circ}{.}07$ (p.e.$_1$ $= 3\overset{\circ}{.}20$)

or restricting to 3 good points

$= - 0\overset{\circ}{.}30 \pm 1\overset{\circ}{.}92$ (p.e.$_1$ $= 3\overset{\circ}{.}32$)

All comparisons tend to indicate that the longitudes derived from drawings in 1958 may be systematically too small by about $0\overset{\circ}{.}3 \pm 0\overset{\circ}{.}3$ (p.e.), but the size of the probable error precludes a definite conclusion. The values of the probable errors of the longitude differences (drawing - transit) for 1958 and 1941 (good points only) indicates that the probable error of each determination assumed of equal precision is about 1°, in agreement with the conclusions of section 3 above.

V. ROTATION PERIOD AND ABSOLUTE LONGITUDES

The longitudes listed in Table 2 are derived from the longitudes ω of the central meridian computed from the American Ephemeris. The ephemeris longitude is given by

$$\omega = \omega_0 + \frac{2\pi}{P}(t - t_0)$$

where $\omega_0 = 344\overset{\circ}{.}41$ on January 15.0, 1909 and P = 24 h 37 m 22.6542 s is the sidereal rotation period of Mars (for a discussion of these data, see J. Ashbrook 1953). ω_0 is an arbitrary constant so chosen as to make the longitude of the spot "Sinus meridiani" approximately equal to zero in accordance with tradition; $t - t_0$ is the time elapsed since t_0 measured in Ephemeris Time.

The longitudes measured at time t are consequently subject to two errors:

a) error in the rotation period adopted in the ephemeris, which has a probable error of about 0.01 second,

b) error due to the departures between Ephemeris Time (ET) and Universal Time (UT) used in the observations.

Ashbrook (1953) derived from transit observations of 16 first-class points between 1704 and 1952 a mean rotation period

$$P = 24 \text{ h } 37 \text{ m } 22.669 \pm 0.002 \text{ s (p.e.)}$$

of Ephemeris Time, or more precisely a correction

$$\Delta P = + 0.0147 \pm 0.0018 \text{ s (p.e.)}$$

to the rotation period adopted in the ephemeris (*). The cumulative effect of this correction between 1909 and 1939, 1941 and 1958 amounts to - 0°65, - 0°70, and - 1°06 respectively, the longitudes computed with the corrected rotation period being <u>less</u> than the values computed with the ephemeris data.

Ashbrook (1953) has also tabulated, after Brouwer, the

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* A positive correction to the ephemeris rotation period is also indicated by a comparison of the longitudes of Table 2 with the longitudes derived from the observations of 1939 (de Vaucouleurs 1948) for 38 points well observed at both oppositions; the derived correction is

$$\Delta P = + 0.0058 \pm 0.0090 \text{ s (p.e.)}$$

The average deviation of the differences $\Delta\lambda$ (1958 -1939) for first-class points corresponds to probable errors of 0°9 in each of the 1939 and 1958 data assumed of equal precision. This arc is equivalent to the angular rotation of Mars in 3.7 minutes of time, or again to an angular error of 0"16 near the center of the disk when its diameter is 20". One equatorial degree of longitude on Mars is equal to 60 kilometers at the surface of the planet.

values of $\Delta t = ET - UT$ and the corresponding corrections to the computed longitudes

$$\Delta_E\lambda = 2\pi\Delta t/P$$

of the central meridian of Mars. This correction was $-\Delta_E\lambda = -0\overset{\circ}{.}07$ in 1939 and 1941; according to a personal communication of W. Markowitz, U.S. Naval Observatory, $\Delta t \approx 32.$ s in 1958, and $-\Delta_E\lambda = -0\overset{\circ}{.}10$.

It follows that the longitudes of Tables 2 and 10 require total corrections

	1939	1941	1958
$\Delta\lambda_0$	$-0\overset{\circ}{.}72$	$-0\overset{\circ}{.}77$	$-1\overset{\circ}{.}16$

to place them on an absolute longitude system consistent with the original definition adopted in the ephemeris and freed from the errors in the rotation periods of Mars and of the Earth.

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Table 1 - Coding and Identification of 546 Points of the Surface of Mars Measured in 1958

Point	n	Description
1001	6	South point of Fastigium Aryn
1002	7	Center of Meridiani Sinus
1003	4	Center of West horn of Meridiani Sinus
1004	2	South point of West horn of Meridiani Sinus
1005	5	West point of Meridiani Sinus
1006	2	Intersection of West horn of Meridiani S. and new horn on Aram
1007	3	North tip of new horn on Aram
1008	2	Center of new horn on Aram
1009	2	South point of new horn on (Aram) Deucalionis R.
1010	1	Mid-point of Jani Fretum (inv.)
1011	5	Mouth of Jani Fretum on Margaritifer Sinus
1012	2	South-West point of Deucalionis Regio
1013	2	North-West point of Pandorae Fr. on Deucalionis R.
1014	2	Middle-West point of Pandorae Fr.
1015	2	South-West point of Pandorae Fr. on Noachis
1016	4	East point of Pyrrhae Regio
1017	2	South point of Pyrrhae Regio
1018	2	South point of Margaritifer Sinus on Pyrrhae Regio
1019	2	North point of Pyrrhae R. on Margaritifer S. (Dargamanes on Pyrrhae R.?)
1020	2	East point of Eos on Margaritifer S. (Dargamanes on Pyrrhae R.?)

Point	n	Description
1021	1	Mouth of diffuse band crossing Chryse on West shore of Margaritifer Sinus
1022	4	West point of Margaritifer Sinus on Chryse and Eos (Arom. From.)
1023	2	East lacus on Chryse under Eos (Arom. From.)
1024	2	West lacus on Chryse under Eos (Arom. From.)
1025	5	West point of Eos on Chryse (= East point of Aurorae S.)
1026	4	West point of Eos on Aurorae Sinus
1027	4	South-West tip of Eos
1028	1	(North point of Erythaeum Mare on Eos)
1029	1	South-East tip of Eos
1030	1	Center of (Vulcani Pelagus)
1031	2	(South point of Vulcani Pelagus)
1032	1	(North point of Argyre I)
1033	3	(North-East corner of Argyre I on Argyroporos)
1034	2	South-West point of brighter northern part of Argyre I on Argyroporos
1035	2	South point of brighter northern part of Argyre I
1036	1	Mid-point of Argyroporos?
1037	1	South point of Noachis
1038	3	South mouth of Argyroporos on M. Australe
1039	1	South point of Argyre I
1040	1	Dark node South of Argyre I
1041	3	Center of intersection Nereidum Fretum and "Oceanidum Fretum" (Campi Phlegraei)

Point	n	Description
1042	1	South-West corner of Argyre I
1043	3	West point of brighter northern part of Argyre I
1044	1	Dark node in Nereidum Fretum
1045	6	North-West corner of Argyre I
1046	5	North-East tip of Ogygis Regio
1047	1	Dark node in Bosporos Gemmatus
1048	1	East point of Phrixi Regio
1049	6	North point of Phrixi Regio
1050	1	South point of Capri Cornu
1051	3	East point of Capri Cornu on Erythraeum Mare
1052	4	North-East point of Capri Cornu on Aurorae S.
1053	5	North point of Aurorae S.
1054	7	Mouth of Baetis on Aurorae S.
1055	6	Mouth of Coprates on Aurorae S., North point (South point of Ophir)
1056	7	Mouth of Coprates on Aurorae S., mid-point
1057	6	Mouth of Coprates on Aurorae S., South-point
1058	6	South point of Aurea Cherso. = Mouth of Nectar on Erythraeum M., North point
1059	5	Mouth of Nectar on Erythraeum M., mid-point
(2023)	6	Mouth of Nectar on Erythraeum M., South point = East tip of Thaumasia
1060	28	Center of South polar cap
1501	2	Preceding tip of West horn of Meridiani S.

Point	n	Description
1502	6	Mid point of tip of West horn of Meridiani S.
1503	2	Following tip of West horn of Meridiani S.
1504	2	North tip of Margaritifer Sinus, preceding corner
1505	2	North tip of Margaritifer Sinus, mid point
1506	2	North tip of Margaritifer Sinus, following corner
1507	2	Oxia Palus, South point
1508	2	Oxia Palus, East point (canal junction)
1509	2	Oxia Palus, North tip
1510	4	Oxia Palus, center
1511	2	Oxia Palus, North-West indentation
1512	2	Oxia Palus, West tip
1513	1	Mouth of Deuteronilus on East edge of Niliacus L.
1514	2	Center of East lobe of Niliacus L.
1515	3	South tip of East lobe of Niliacus L.
1516	2	South point of Niliacus L. between E. and W. lobes
1517	2	South tip of West lobe of Niliacus L.
1518	2	Center of West lobe of Niliacus L.
1519	2	West point of Niliacus Lacus on Xanthe
1520	1	North point of bright area on Chryse
1521	1	Mid-point of broad streak (Jamuna?)
1522	1	West point of bright area on Chryse
1523	1	Point of broad streak on Chryse
1524	1	Center of diffuse knot on Xanthe (Intersection of Jamuna and Hydraotes?)
1525	1	South point of bright region on Northern part of Xanthe

Point	n	Description
1526	1	Center of bright region on Northern part of Xanthe
1527	1	North-East tip of bright region on Northern part of Xanthe
1528	1	Center of Idaeus Fons
1529	3	East point of Tempe on M. Acidalium
1530	1	West point of dark knot in 1528.
1531	1	South point of dark knot 1528
1532	1	Center of weak spot on Nilokeras
1533	1	West point of weak spot on Nilokeras (or Tractus Albus N.)
1534	1	Mid point of broad streak on Xanthe
1535	1	East point of lighter area on Xanthe
1536	1	Mid point of Hydraotes? on Xanthe
1537	1	South point of lighter area on Xanthe
1538	2	East point of Lunae Lacus
1539	2	South-East point of Lunae Lacus
1540	2	North-East point of Lunae Lacus
1541	1	North point of lighter area on Xanthe
2001	6	Center of Juventae Fons
2002	1	Center of Ophir
2003	1	East point of Melas Lacus (canal junction?)
2004	1	Center of preceding component of Melas L.
2005	1	South point of Melas Lacus
2006	5	Center of Melas Lacus
2007	1	Center following component of Melas L.
2008	3	North point of Melas L. on Ophir

Point	n	Description
2009	3	North-West point of Melas L.
2010	3	West point of Melas L. on
2011	5	North point of Agathodaemon
2012	5	North point of East end of Sinai on Agathodaemon
2013	4	Center of Noctis Lacus
2014	4	West point of Tithonius L. (on Tractus Albus)?
2015	4	West point of Noctis Lacus
2016	4	South point of Noctis Lacus (canal junction Calydon?)
2017	1	North-West point of brighter section of Sinai (on Copratos)
2018	4	West point of brighter section of Sinai (Aurea Chersonesus)
2019	4	North point of Nectaris Fons
2020	3	Center of Nectaris Fons
2021	6	East tip of Thaumasia (mouth of Nectar on M. Erythraeym, S. point)
2022	5	Center of Delphini Portus
2023	2	South point of Ogygis Regio
2024	1	Intersection of Bosporos and Oceanidum Fretum
2025	3	North point of Dia
2026	3	South point of Coracis Portus
2027	2	Center Depressio Pontica
2028	4	Center of Coracis Portus
2029	4	Mouth of Ambrosia on Coracis Portus
2030	5	Mouth of Ambrosia on Solis Lacus (Fulgoris D.)

Point	n	Description
2031	4	West point of Fulgoris Depressio (SW lobe of Solis L.)
2032	5	South point of East lobe of Solis Lacus
2033	5	East point of East lobe of Solis Lacus (East mouth of Nectar, mid-point)
2034	3	Center of East lobe of Solis Lacus
2035	2	Center of Lucis Portus (darker knot in E. lobe of Solis L.)
2036	5	North point of East lobe of Solis Lacus
2037	5	Center of Solis Lacus
2038	4	East point of Phoebi Depressio (NW lobe of Solis L.)
2039	4	North point of Phoebi Depressio
2040	3	Mouth of Calydon (?) on Phoebi D.
2041	5	Center of Phoebi D.
2042	4	Contact point of Phoebi D. and Fulgoris D. (center of West lobe of Solis L.)
2043	5	Center of Fulgoris D. (SW lobe of Solis L.)
2044	5	Mouth of Bathys on Fulgoris D.
2045	3	West point of Fulgoris D.
2046	3	South-West point of West lobe of Solis L. (or center of small knot?)
2047	4	South-West point of West lobe of Solis L. at West end of small knot
2048	2	South-West point of Phoebi D.?
2049	4	West point of Phoebi D. (mouth of Eosphoros)

Point	n	Description
2050	4	South point of Thaumasia (Heraeum Prom.)
2051	4	South-West tip of Chrysokeras (Bosporium Prom.)
2052	5	East point of Bathys Portus (junction of Thaumasia and Chrysokeras)
2053	5	Mouth of Bathys on Bathys Portus
2054	5	Center of Bathys Portus
2055	1	South point of Bathys Portus
2056	4	West point of Bathys Portus
2057	4	North point of Aonius Sinus (mouth of Phasis)
2058	4	North point of Aonius S. on Icaria?
2059	2	East point of anomalous Icaria (cloud?)
2060	1	South-East point of anomalous Icaria
2061	1	Point on South edge of anomalous Icaria
2062	1	Mid-point of Hyscus?
2063	5	Intersection of Phasis and canal from Sirenius Lacus
2064	2	Mid point of Araxes
2065	4	
2066	4	Center Arsia Silva
2067	4	West point of Tractus Albus (Lux)
2068	2	West point of bright formation of Tractus Albus South (cloud?)
2069	1	South-West point of bright formation of Tractus Albus South
2070	1	South point of bright formation on Tractus Albus South

Point	n	Description
2071	5	South point of Tractus Albus (NE point of Phoenicis L.)
2072	1	East point of Phoenicis Lacus
2073	5	South point of Phoenicis Lacus (junction Phasis)
2074	5	Center of Phoenicis Lacus
2075	5	South point of Fulgens Mons
2076	4	East point of Fulgens Mons (West point of Arsia Silva?)
2077	5	Center of Fulgens Mons (brightest point)
2078	4	West point of Fulgens Mons
2079	1	?
2080	1	?
2081	5	North point of Fulgens Mons
2501	3	Center of Lunae Lacus
2502	3	South-West point of Lunae Lacus on Candor
2503	5	West point of Lunae Lacus on Candor
2504	2	North-West point of Lunae Lacus on Candor (junction Nilokeras?)
2505	1	North point of Lunae Lacus?
2506	4	Center of Hebes Lacus
2507	1	North point of Hebes Lacus
2508	4	Mouth of Chrysorrhoas on Tithonius Lacus?
2509	1	Mid-point of Uranius?
2510	2	Center of North angle of Tithonius Lacus
2511	1	Center of Echus Lacus

Point	n	Description
2512	3	North point of Echus Lacus
2513	1	Mid point of Fortuna (?)
2514	2	East point of bright formation on Tractus Albus (cloud?)
2515	1	Mid point in break in bright formation on Tractus Albus
2516	2	North point of bright formation on Tractus Albus
2517	5	Center of Ascraeus Lacus
2518	1	West mouth of Uranius?
2519	4	Mid point of broad band NE of Ascraeus L.
2520	1	North-West point of Tractus Albus
2521	1	South point of Acidalius Fons
2522	2	Center of Acidalius Fons (?)
2523	2	North point of Acidalius Fons at edge of North polar cap
2524	4	South tip of brighter area α on Tempe
2525	2	East point of brighter area β on Tempe
2526	3	East point of Ascuris Lacus (?)
2527	1	West point of area α on Tempe (SE point of Ascuris L.)
2528	2	South point of Ascuris Lacus (?)
2529	4	North point of area β
2530	4	Center of Ascuris Lacus
2531	3	North point of Ascuris Lacus at edge of NPC
2532	4	West point of Ascuris Lacus
2533	3	East point of area γ (= Alba?) on Ascuris L.
2534	2	Mid point of broad band between α and γ

Point	n	Description
2535	4	South point of area γ (= Alba?)
2536	4	Mid point of broad channel (south of γ)
2537	4	South point of broad channel
2538	3	West point of area β
2539	3	Center of curvature of S part of area β
2540	4	South point of area β
2541	1	Mid-point of channel between β and δ
2542	4	East point bright area δ
2543	4	South point bright area δ
2544	3	Mid-point of dark streak connecting Ascraeus Lacus and small bright region to SW
2545	5	Mid-point of Ulysses (?)
2546	2	Center of small bright region
2547	1	(Intersection)
2548	6	Center Hougerius Lacus
2549	1	East point of Hougerius Lacus?
2550	4	East point of Hougerius Lacus
2551	1	North point of Hougerius Lacus
2552	4	South-West point of broad channel
2553	4	Mid-point of broad channel SW of
2554	2	West point of area
2555	2	South point of Lacus A
2556	4	East point of Lacus A
2557	4	Center point of Lacus A
2558	3	North point of Lacus A at edge of NPC

Point	n	Description
2559	1	?
2560	3	?
3001	5	Center of Nodus Gordii
3002	1	Point on Eumenides
3003	3	North-East point of Memnonia
3004	3	? } points on Sirenius
3005	1	? } points on Sirenius
3006	4	North-East point of Sirenius Fons (junction Sirenius?)
3007	6	North-East point of Sirenum Sinus (junction Araxes)
3008	6	East point of Sirenum Sinus on Daedalia
3009	5	West point of Daedalia on Sirenum Sinus (junction Hyseus)
3010	4	Center of curvature of NE tip of Sirenum Sinus
3011	5	Junction Sirenum Sinus and Sirenius Fons (center of Sirenum S. when not resolved)
3012	4	Center of Sirenius Fons
3013	2	North point of Sirenius Fons?
3014	4	West point of Sirenius Fons (junction Erinnys)
3015	5	East point of Sirenum Promontorium
3016	4	South point of distorted Icaria (cloud?)
3017	1	Center of notch at Thermodon (?) mouth on Palinuri Fr.
3018	1	Mouth of Thermodon (?)
3019	1	Mid-point of Thermodon (?)
3020	3	East point of Phaethontis
3021	1	South-East point of notch at Thermodon (?) mouth on Sirenum Mare

Point	n	Description
3022	1	Center of notch at Thermodon mouth on Sironum Mare
3023	3	South point of M. Sirenum or mouth of Thermodon(?)
3024	11	South point of Sirenum Promontorium
3025	1	Mid-point of Erinnys East
3026	4	Mid-northern limit of Memnonia
3027	2	Mid-point of Eumenides
3028	3	North point of Memnonia East of Gorgon
3029	3	Center of (Lucus Maricae?) intersection of Gorgon-Eumenides
3030	2	Junction of Gorgon on 3029 or NW point of Gorgon
3031	2	North point of Memnonia West of Gorgon
3032	3	Mid-point of East limit of Mesogaea between 3029 and 3059
3033	1	Mid-point of Erinnys West
3034	7	North point of Gorgonum Sinus (mouth of Gorgon)
3035	1	Junction of Erinnys and Gorgonum Sinus
3036	2	West point of Gorgonum Sinus
3037	4	East point of Gorgonum Sinus?
3038	8	South-East point of Fusca Depressio (S. point of M. Sirenum?)
3039	4	South-West point of Fusca Depressio (junction of Ios Insula?)
3040	6	South-East point of West half of M. Sirenum
3041	2	West point of Caralis Fons
3042	2	Center of Caralis Fons

Point	n	Description
3043	1	East point of Caralis Fons
3044	6	South point of Phaethontis
3045	4	South-West point of Phaethontis
3046	5	Mouth of Simois on M. Chronium, mid-point (Simoentis S.)
3047	4	East point of Electris
3048	6	Mid-point of mouth of Simois on Mare Cimmerium
3049	9	East point of M. Cimmerium on Phaethontis-Atlantis
3050	11	North point of Electris
3051	6	North point of M. Cimmerium on Zephyria at junction Atlantis-Rasena
3052	2	West point of Atlantis on Zephyria
3053	2	Mid-point of junction Atlantis-Zephyria
3054	9	West point of M. Sirenum (Atlantidum Sinus)
3055	6	South point of Gorgonum Promontorium
3056	4	West point of Gorgonum Promontorium
3057	1	?
3058	5	Mouth of Erinnys on Titanum Sinus
3059	12	North point of Titanum Sinus
3060	2	North point of Jubar (?) on Tartarus
3061	2	(North) east point of bright area on Zephyria
3501	1	North point of area
3502	5	East point of Hougeria (West point of Hougerius Lacus) area
3503	1	Center of area
3504	3	Junction of area and Lacus A

Point	n	Description
3505	4	West point of Lacus A
3506	3	South point of region
3507	2	Center of knot NE of Hougeria
3508	2	East point of region
3509	2	South point of region
3510	1	Center of small node East of Euxinus Lacus
3511	1	North point of 3510 on edge of NPC
3512	2	East point of Euxinus Lacus
3513	2	North point of Euxinus Lacus on edge of NPC
3514	3	Center of Euxinus Lacus
3515	2	South point of Euxinus Lacus
3516	2	West point of Euxinus Lacus
3517	1	East point of Propontis I
3518	1	North point of Propontis I at edge of NPC
3519	6	Center of Propontis I
3520	1	South point of Propontis I
3521	2	West point of Propontis I
3522	5	Mid-point of Tartarus?
4001	5	East point of Rasena, junction on Zephyria
4002	12	East point of Laestrygonum Sinus
4003	12	North point of Laestrygonum on Laestrygonum Sinus
4004	13	Center of Laestrygonum Sinus
4005	1	North-East point of Laestrygonum Sinus
4006	15	North point of Laestrygonum Sinus
4007	1	East point of Aeolis North of Laestrygonum S.

Point	n	Description
4008	1	Junction of Antaeus and Laestrygon?
4009	3	West point of Laestrygonum Sinus on Draconis Prom.
4010	11	South-West point of Laestrygonum Sinus (mouth of Draconis Fretum)
4011	14	West point of Rasena on Draconis Fretum
4012	15	South point of Rasena
4013	10	South point of Electris
4014	3	Center of knot in Mare Chronium (Achaeorum Portus?)
4015	14	Mouth of Scamander on Mare Chronium
4016	15	Mouth of Scamander on Mare Cimmerium
4017	8	North point of Eridania (East of Eridani Promontorium?)
4018	7	South point of Draçonis Promontorium
4019	2	Center of bright area on Draconis Prom.
4020	3	West point of Draconis Prom. (mouth of canal?)
4021	1	South point of Aeolis West of Draconis Prom.
4022	2	Mid-point of Antaeus
4023	16	South-East point of Gomer Sinus
4024	16	Center of SE lobe of Gomer Sinus
4025	10	North-West point of SE lobe of Gomer Sinus
4026	12	South point of Eridania
4027	1	North point of Eridania (West of Eridani Prom.?)
4028	17	East point of M. Tyrrhenum (junction Hesperia-Eridania)
4029	21	Mouth of Xanthus on M. Tyrrhenum
4030	20	Mouth of Xanthus on Tiphys Fretum
4031	10	Center of dark knot in Tiphys Fretum (Nepheles Depressio?)

Point	n	Description
4032	6	North-East point of Cimmeria Depressio (near Cyclopieum Sinus)
4033	12	South-East point of NW lobe of Sinus Gomer
4034	1	Mouth of Cyclops on Gomer Sinus?
4035	18	Center of North-West lobe of Sinus Gomer
4036	9	South-East point of Aethiopis (near Cerberi Sinus?)
4037	2	Cerberi Sinus?
4038	3	Center of Cimmeria Depressio
4039	2	South-West point of Cimmeria Depressio on Hesperia (canal junction?)
4040	6	South point of Aeolis West of Draconis Prom.
4501	1	Mid-point of Hades I (?)
4502	1	East point of small lacus attached to Trivium Charontis
4503	2	Center of small lacus East of Trivium Charontis
4504	11	East point of Trivium Charontis (West point of lacus)
4505	2	South point of Trivium Charontis
4506	17	Center of Trivium Charontis
4507	2	North point of Trivium Charontis
4508	3	Center of Stygis Lacus (?)
4509	5	North-West point of Stygis Lacus (?)
4510	7	Center of Hecates Lacus
4511	1	Center of Albor
4512	11	West point of Trivium Charontis
4513	2	Mid-point of break in Cerberus
4514	7	East point of Cerberus Lacus

Point	n	Description
4515	10	Center of Cerberus Lacus
4516	1	West point of Cerberus Lacus
4517	16	Center of Pambotis Lacus
4518	1	?
4519	6	? Point on Eunostos I
4520	6	West point of border of Elysium (Hephaestus?)
4521	3	Mid-point of Hyblaeus?
4522	8	Center of Morpheos Lacus?
4523	3	Center of Morpheos Lacus?
4524	1	Mid-point of Cyclops
4525	2	North point of brighter part of Aeolis
4526	20	North point of Gomer Sinus
5001	11	Angle of Ausonia Australis on M. Tyrrhenum
5002	2	Center of canal (or Hyria Lacus?) on Hesperia
5003	2	Center of Tritonis Sinus
5004	2	North-West point of Mare Cimmerium
5005	1	North-West point of Tritonis Sinus
5006	3	South point of Amenthes on Hesperia
5007	1	East angle of M. Tyrrhenum B on Hesperia
5008	1	East point of M. Tyrrhenum B on Hesperia (canal junction)
5009	6	South-West point of Hesperia on M. Tyrrhenum (Hesperium Prom.)
5010	16	North point of Ausonia Australis
5011	7	South point of Ausonia Australis on Tiphys Fr.
5012		West point of Promethei Sinus on Chersoneus

Point	n	Description
5013	13	East point of Centauri Lacus (and/or Hadriacum Mare)
5014	6	Center of Centauri Lacus
5015	1	North point of Centauri Lacus
5016	17	North-West point of Ausonia Australis
5017	4	East point of Ausonia Borealis (Trincria)
5018	5	North-East point of Ausonia Borealis (Circaeum Prom.)
5019	9	West point of Syrtis Minor on Libya
5020	13	North point of Syrtis Minor on Libya
5021	9	South-West point of Libya
5022	6	West point of Libya (junction of Crocea)
5023	3	West point of Libya?
5024	14	South point of Syrtis Major
5025	13	South-East point of Nymphaeum Promontorium
5026	5	North point of Ausonia Borealis above 5021
5027	5	North-West point of Ausonia Borealis
5028	8	North-West point of Posidium Promontorium
5029	4	West point of Ausonia Borealis (when 5028 not marked)
5030	17	North point of Hellas
5031	13	Mouth of Alpheus on Mare Hadriacum (Bucoleontis Portus)
5032	1	North-East point of Hellas
5033	16	East point of Hellas
5034	3	Mouth of Peneus on Mare Hadriacum
5035	10	Center of Zea Lacus
5036	1	South-East point of NW lobe of Hellas
5037	2	Mouth of Peneus on W side of Zea Lacus
5038	4	Mouth of Alpheus on Mare Amphitrites

Point	n	Description
5039	1	?
5040	3	South point of SE lobe of Hellas
5041	10	West point of Chersonesus
5042	4	South-West point of Mare Hadriacum (mouth of Euripus I)
5043	5	South-West of Libye or Crocea
5044	2	North-West point of Tritonis Sinus?
5501	1	Center of bright area in Aethiopis
5502	6	Center of small [illegible] at [illegible] elbow of canal (Cylicnius Lacus?)
5503	7	Mouth of canal on Nodus Laocoontis
5504	18	South East point of Nodus Laocoontis (mouth of canal)
5505	5	West point of Nodus Laocoontis
5506	18	Center of Nodus Laocoontis
5507	4	East point of new dark region at "waist"
5508	6	West point of North lobe of new dark region
5509	[illegible]	Center of North lobe of new dark region
5510	[illegible]	West point of North lobe of new dark region, further North
5511	1	?
5512	4	East point of North lobe of new dark region at edge of NPC
5513	1	East point of Nodus Alcyonius
5514	1	East point of Thoth I?
5515	1	?

Point	n	Description
5516	8	North point of Amenthes between Nubis Lacus and Nodus Laocoontis
5517	2	Mouth of canal (Triton?) on Nubis Lacus
5518	2	South point of Nubis Lacus (junction East point of Nepenthes)
5519	6	Center of Nubis Lacus
5520	6	Center of Nubis Lacus
5520	6	Center of dark area including Nubis Lacus
5521	1	?
5522	1	North point of dark area including Nubis Lacus
5523	1	South point of Nodus Alcyonius?
5524	10	Center of Nodus Alcyonius
5525	3	North-West point of Casius at edge of NPC
5526	3	East point of Neith Regio NW of Nodus Alcyonius
5527	4	East point of Isidis Regio NW of Nubis Lacus
5528	1	West point of Nubis Lacus
5529	5	Mouth of Nepenthes on Nubis Lacus, mid-point
5530	3	Mid-point of Nepenthes (near Tritonis Lacus)
5531	8	East point of Moeris Lacus
5532	5	Mouth of Nepenthes on Moeris Lacus, East point
5533	11	Mid-point of mouth of Nepenthes on Moeris Lacus
5534	2	Mouth of Nepenthes on Moeris Lacus, West point
5535	9	Center of Moeris Lacus
5536	2	North-West point of Moeris Lacus on Osiridis Prom.
5537	9	Mouth of Moeris Lacus on Syrtis Major, South point

Point	n	Description
5538	9	Mouth of Moeris Lacus on Syrtis Major, mid-point
5539	10	Mouth of Moeris Lacus on Syrtis Major, North point (Osiridis Prom.)
5540	3	South point of Nili Sinus, junction Arena-Osiridis Prom.
5541	1	East point of Nili Sinus?
5542	?	East point Nili Sinus, junction of Nili Pons
5543	1	Mid-point of Nili Pons
5544	1	East point of Nili Lacus, junction of Nilosyrtis
5545	[illegible]	North-East point of Nili Lacus, junction of Nilosyrtis (mid-point)
5546	1	North point of Nili Lacus, junction of Nilosyrtis
5547	8	East point (center) of Nilosyrtis
5548	2	North-West point of Neith Regio?
5549	3	Mouth of Nilosyrtis on Umbra
5550	10	Center of dark knot at mouth of Nilosyrtis on Umbra
5551	[illegible]	North point of 5550 at edge of NPC
5552	6	Center of Coloe Palus
5553	5	West point of Astusapes (Paebous Lacus?)
5554	1	West point of Nili Lacus, junction of Nili Pons
5555	1	North point of Nili Sinus, junction of Nili Pons - South point of Meroe I.
5556	15	North-West point of Astusapis Sinus
5557	1	Center of Astusapis Sinus
5558	1	North-West point of Nili Sinus, on Astusapis Sinus
5559	1	West point of Aeria North of Astusapis Sinus

Point	n	Description
5560	4	West point of Nili Sinus, junction of Arena-Aeria, N. joint
5561	6	Junction of Arena-Aeria, South point
5562	0	West point Syrtis Major
5563	14	West point of Syrtis Major on Aeria, North of Nymphaeum Prom.
5564	1	South point of Nodus Laocoontis
5565	7	North-West tip of Tritonis Sinus? (Cyllenius L.?)
6001	1	Center of dark spot SE of Incurva Insula
6002	8	South-East mid-point of Incurva Insula
6003	2	Center of Typhonii Sinus
6004	14	North-West point of Deltoton Sinus (Typhonii Sinus)
6005	14	East point of Mare Serpentis
6006	1	?
6007	1	North-West point of Hellas on Yaonis Fretum
6008	8	North-East point of Yaonis Regio
6009	9	Center of Neroi Depressio
6010	5	Mouth of Peneus on Yaonis Fretum
6011	2	West point of SW lobe of Hellas
6012	0	South-West edge of Hellas
6013	3	Mid-South point of Yaonis Fretum
6014	1	South-East point of Yaonis Regio
6015	1	?
6016	1	?
6017	6	North-East mouth of Hellespontus on M. Serpentis

Point	n	Description
6018	3	South-East point of M. Serpentis?
6019	3	South-West point of Mare Serpentis, junction Noachis-Pandorae Fretum
6020	2	West mid-point of Mare Serpentis, junction Pandorae Fretum
6021	2	North-West point of Mare Serpentis, junction Deucalionis R.-Pandorae F.
6022	2	South point of Deucalionis Regio?
6023	13	East point of Deucalionis Regio (Dium Promontorium)
6024	16	South-East point of Hammonis Cornu
6025	1	?
6026	4	South point of Aeria, East of Sigeus Portus
6027	5	North point of East bay of Sigeus Portus
6028	5	North point of West Bay of Sigeus Portus
6029	3	North point of Deucalionis Regio, South of Sigeus Portus W. bay
6030	4	North-West point of Edom Sinus on Edom
6031	2	North point of Deucalionis Regio, South of Edom Sinus
6032	7	Notch in coast line of Edom, East point of Edom Prom.
6033	6	South point of Edom Promontorium
6034	6	West point of Edom promontorium
6035	5	North-West point of Edom Promontorium on East horn of S. Meridiani
6036	1	Center of dark knot in East horn of S. Meridiani
6037	5	Center of East horn of S. Meridiani

Point	n	Description
6038	8	South point of East horn of S. Meridiani
6039	2	Mouth of Hyllus on Pandorae Fretum
6040	2	Mouth of Hyllus on Mare Australe
6501	2	Center East lobe of Ismenius Lacus
6502	1	North point of Ismenius Lacus on NPC
6503	8	Center of Ismenius Lacus
6504	2	Center West lobe of Ismenius Lacus
6505	2	South point of Ismenius Lacus
6506	2	North point of Hiddekel
6507	2	North point of Gehon
6508	4	West end of Deuteronilus, near Dirce Fons
6509	8	North point of East horn of Sinus Meridiani

Table 2

AREOGRAPHIC COORDINATES

1958 Pt.no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
1001	1	2.0	2.2	357.8	3.62	- 2.2	4.12	6
1002	195	2.4	2.6	358.8	3.72	- 5.3	4.32	7
1003		1.8	2.0	5.0	3.04	- 3.6	3.28	4
1004	(116)	3.0	2.0	4.2	1.94	-10.1	1.97	2
1005	115	1.6	3.0	5.0	3.58	- 4.6	2.18	5
1006		2.0	2.5	6.2	1.92	- 3.6	1.96	2
1007		2.0	3.0	7.8	2.22	- 0.7	2.46	3
1008		2.0	2.5	7.7	1.94	- 5.6	1.97	2
1009		2.5	2.5	7.7	1.96	- 9.1	1.98	2
1010	151	3.0	1.0	11.6	0.98	- 8.2	0.99	1
1011	117	1.4	2.4	13.8	3.13	- 5.2	3.67	5
1012	(203)	1.5	2.5	17.0	1.28	-10.6	1.54	2
1013	86	3.0	2.0	2.2	1.90	-17.1	1.95	2
1014	303	2.5	3.0	359.7	1.82	-22.1	1.91	2
1015	(203)	3.0	2.5	2.7	1.81	-25.1	1.90	2
1016		3.0	2.8	6.5	2.94	-23.3	3.23	4
1017		3.0	2.0	19.8	1.81	-25.6	1.90	2
1018		3.0	2.5	19.3	1.86	-22.0	1.93	2
1019	176	3.0	3.0	25.2	1.81	-20.0	1.90	2
1020		2.0	3.0	29.2	1.77	-16.1	1.88	2
1021		2.0	2.0	20.8	0.97	- 1.9	0.98	1
1022	½(1022+1025)	2.5	2.0	28.4	2.68	- 8.8	3.13	4
1023		2.0	2.0	27.7	1.79	- 4.1	1.89	2

1958 Pt. no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
1024		2.0	2.0	34.0	1.65	- 3.5	1.81	2
1025	11	2.2	2.0	36.3	2.81	- 8.6	3.61	5
1026		2.3	2.5	39.9	2.43	-13.6	3.07	4
1027		2.5	2.8	36.4	2.37	-16.6	3.00	4
1028		2.0	2.0	35.8	0.91	-15.9	0.96	1
1029		2.0	2.0	34.8	0.91	-19.9	0.95	1
1030	12	2.0	2.0	33.8	0.85	-28.9	0.92	1
1031	10	2.5	2.0	31.3	1.51	-32.6	1.74	2
1032		2.0	2.0	27.8	0.86	-31.9	0.93	1
1033	(215)	3.0	2.3	15.7	2.31	-31.4	2.54	3
1034		3.0	3.0	16.1	1.53	-39.1	1.75	2
1035	(9)	2.5	2.0	33.5	1.26	-41.6	1.58	2
1036		2.0	3.0	18.6	0.66	-44.2	0.80	1
1037	206?	3.0	2.0	0.8	0.51	-52.9	0.71	1
1038		3.0	2.7	14.4	1.46	-55.3	1.95	3
1039	(216)	3.0	2.0	28.8	0.52	-54.9	0.72	1
1040		3.0	2.0	32.8	0.42	-59.9	0.65	1
1041		2.3	2.3	66.6	1.09	-52.1	1.80	3
1042	155	3.0	3.0	54.8	0.41	-49.9	0.64	1
1043	218	2.3	2.7	49.7	1.33	-44.6	1.99	3
1044		3.0	3.0	46.9	0.49	-38.6	0.70	1
1045		2.8	2.2	38.7	2.58	-33.1	3.75	6
1046		2.6	2.4	45.1	2.43	-31.5	3.45	5
1047		3.0	3.0	58.9	0.64	-37.6	0.80	1
1048		3.0	2.0	51.9	0.61	-32.6	0.78	1

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
1049		3.0	2.5	55.2	3.00	-28.2	4.20	6
1050		3.0	2.0	46.5	0.42	-21.1	0.65	1
1051		2.3	2.7	46.9	1.93	-21.0	2.40	3
1052		2.5	2.3	47.1	2.45	-15.3	3.11	4
1053	15	2.4	2.0	47.6	2.70	- 4.5	3.56	5
1054	16	2.3	2.3	53.9	3.42	- 7.4	4.74	7
1055		2.7	1.7	57.7	3.38	-12.6	4.46	6
1056	18	2.6	1.9	58.5	3.57	-13.7	4.79	7
1057		2.5	1.7	58.8	3.40	-15.1	4.47	6
1058		2.2	2.0	58.7	3.20	-22.3	4.39	6
1059	38	2.2	2.0	58.9	2.80	-23.9	3.78	5
1060		3.0	[illegible]	6.1	0.24	-81.6	2.36	32
1501	(2)	2.0	2.0	357.8	[illegible]	3.4	1.87	2
1502	2	1.5	1.7	[illegible]	1.82	5.0	2.55	6
1503	(2)	2.0	2.0	359.7	1.77	3.4	1.88	2
1504		2.0	2.0	13.7	1.86	1.9	1.93	2
1505	5	3.0	1.5	14.2	0.31	9.3	1.11	2
1506		2.0	2.0	[illegible]	1.83	2.9	1.91	2
1507	(3)	2.0	2.0	12.7	1.82	4.9	1.91	2
1508	(3)	2.0	2.0	11.7	1.78	6.9	1.89	2
1509	(3)	2.0	2.0	10.7	1.67	11.9	1.83	2
1510	3	1.5	1.5	13.1	2.52	9.7	2.97	4
1511	(3)	2.0	2.0	14.7	1.73	8.9	1.86	2
1512	(3)	2.0	2.0	17.7	1.76	6.9	1.87	2

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
1513	222?	2.0	2.0	15.8	0.57	29.1	0.76	1
1514	226?	2.5	2.5	20.[illegible]	0.97	33.3	1.40	2
1515	281	3.0	2.3	21.6	1.31	31.8	1.91	3
1516	227	3.0	2.5	26.2	1.02	30.8	1.42	2
1517	289	2.7	2.3	33.9	1.16	30.5	1.80	3
1518		2.0	2.5	32.6	0.85	33.7	1.31	2
1519		2.0	2.0	39.0	0.83	31.7	1.28	2
1520		[illegible]	[illegible]	[illegible]	[illegible]	19.1	0.80	1
1521		3.0	3.0	35.8	0.66	20.1	0.81	1
1522		2.0	2.0	33.8	0.77	13.1	0.88	1
1523		3.0	3.0	32.8	0.88	3.1	0.94	1
1524	(225)	3.0	3.0	40.8	0.71	13.1	0.84	1
1525		[illegible]	2.0	39.8	0.62	21.1	0.79	1
1526		2.0	2.0	41.6	0.47	30.1	0.69	1
1527	221	2.0	2.0	39.8	0.36	38.1	0.60	1
1528	(230)	2.0	2.0	48.8	0.31	38.1	0.56	1
1529	197	2.7	3.0	53.3	0.76	41.8	1.50	3
1530		2.0	2.0	55.8	0.29	36.1	0.54	1
1531		3.0	2.0	48.8	0.38	33.1	0.62	1
1532		3.0	3.0	56.8	0.35	30.1	0.59	1
1533		3.0	3.0	62.8	0.29	30.1	0.54	1
1534		3.0	3.0	48.8	0.52	22.1	0.72	1
1535		2.0	3.0	48.8	0.62	13.1	0.79	1
1536		3.0	3.0	49.8	0.64	10.1	0.80	1
1537		2.0	2.0	53.8	0.57	12.1	0.75	1

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
1538		3.0	3.0	55.3	1.11	16.1	1.48	2
1539		3.0	3.0	57.1	1.24	11.5	1.57	2
1540		3.0	3.0	57.8	0.92	26.8	1.36	2
1541		3.0	2.0	57.5	0.61	0.9	0.78	1
2001	20	1.2	1.0	62.5	3.50	- 3.6	4.51	6
2002		3.0	2.0	63.0	0.39	- 9.5	0.63	1
2003		2.0	2.0	67.5	0.79	-10.1	0.89	1
2004		1.0	1.0	70.5	0.83	-11.1	0.91	1
2005		2.0	1.0	74.0	0.82	-12.7	0.90	1
2006	89	1.8	1.8	72.8	3.64	- 9.2	4.21	5
2007	89?	2.0	2.0	72.5	0.85	- 8.1	0.92	1
2008		2.0	2.0	72.5	2.48	- 6.1	2.61	3
2009		2.3	2.3	76.2	2.44	- 7.4	2.70	3
2010		2.0	2.0	76.5	2.45	-10.1	2.71	3
2011	56	3.0	1.8	84.2	3.91	- 5.5	4.19	5
2012		3.0	1.6	83.4	3.89	- 8.9	4.18	5
2013	90	2.0	2.0	92.4	3.86	- 8.5	3.93	4
2014		2.0	2.0	94.3	3.86	- 5.5	3.93	4
2015	207	2.3	2.8	95.1	3.88	- 8.5	3.94	4
2016		2.3	2.3	91.4	3.85	-11.0	3.92	4
2017		2.0	2.0	67.0	0.54	-14.5	0.74	1
2018		1.5	3.0	68.9	3.03	-16.8	3.47	4
2019	295	2.3	2.0	64.6	2.74	-20.2	3.29	4
2020	(88,295,296)	2.0	2.0	63.7	2.18	-21.8	2.55	3
2021		2.3	2.3	61.0	3.26	-24.9	4.38	6

1958 Pt. no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
2022		3.0	3.0	65.5	2.89	-32.1	3.77	5
2023		2.5	2.5	62.4	0.84	-50.1	1.29	2
2024		3.0	3.0	73.9	0.59	-48.6	0.77	1
2025		3.0	2.0	80.1	1.49	-53.2	2.12	3
2026		2.3	2.3	81.4	1.80	-47.1	2.32	3
2027		3.0	3.0	84.4	0.76	-44.3	1.10	2
2028		2.5	2.5	79.5	2.48	-43.1	3.15	4
2029	[illegible]	2.8	2.5	[illegible]	2.71	-39.5	3.29	4
2030		2.6	2.0	84.9	3.45	-30.5	4.01	5
2031		2.3	2.3	80.6	3.27	-27.2	3.61	4
2032		2.6	2.0	75.9	3.43	-26.3	4.07	5
2033	221	2.2	2.0	70.4	3.37	-23.1	4.06	5
2034	187	2.0	2.0	76.6	1.76	-22.6	2.25	3
2035	(187)	1.5	1.5	74.2	1.77	-21.9	1.88	2
2036		2.8	1.8	75.6	3.63	-18.9	4.19	5
2037	22	2.2	2.4	80.8	3.63	-23.6	4.16	5
2038		2.0	2.0	82.1	3.47	-22.3	3.72	4
2039	122	3.0	1.8	86.4	2.92	-18.6	3.26	4
2040	(122)	2.3	1.7	89.4	2.87	-18.8	2.93	3
2041		2.2	2.0	87.1	3.79	-22.1	4.13	5
2042	157	2.8	2.5	86.6	3.50	-25.2	3.74	4
2043		2.6	2.6	86.0	3.55	-27.6	4.00	5
2044		2.6	2.4	89.0	3.52	-30.2	3.99	5
2045		2.0	2.3	90.8	2.59	-27.8	2.79	3
2046		2.3	2.3	91.4	2.71	-26.5	2.85	3

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
2047	124	2.3	2.5	93.9	2.95	-26.3	3.24	4
2048	(124)	2.0	3.0	92.6	1.78	-24.6	1.89	2
2049		2.0	2.5	92.6	2.68	-22.5	3.83	4
2050	24	2.0	2.0	86.7	2.63	-43.0	3.24	4
2051		2.0	2.0	[illegible]	1.86	-55.7	2.73	4
2052		[illegible]	2.4	93.9	2.98	-40.7	3.68	5
2053		2.2	2.0	95.0	3.20	-37.8	3.82	5
2054	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-39.9	3.75	5
2055		[illegible]	2.0	[illegible]	0.16	-44.2	0.31	1
2056		2.8	2.8	102.3	2.86	-40.2	3.38	4
2057	(126)	2.0	2.0	103.8	3.17	-34.2	3.56	4
2058	126	[illegible]	2.0	108.3	2.55	-35.1	3.02	4
2059		2.5	3.0	110.6	1.00	-41.1	1.26	2
2060		3.0	3.0	121.0	0.55	-49.5	0.74	1
2061		3.0	3.0	[illegible]	0.46	-53.5	0.68	1
2062		3.0	3.0	115.0	0.83	-32.5	0.91	1
2063		2.2	2.2	106.0	3.85	-25.5	4.20	5
2064		2.5	2.5	116.0	1.57	-19.7	1.77	2
2065		2.8	2.8	124.4	3.02	- 2.5	3.46	4
2066		1.5	1.5	112.8	3.60	- 9.8	3.79	4
2067		2.0	2.8	108.6	3.35	- 6.2	3.47	4
2068		2.0	2.0	104.2	1.84	- 5.4	1.92	2
2069		3.0	2.0	99.9	0.92	- 6.6	0.96	1
2070		2.0	2.0	102.5	0.98	- 6.1	0.99	1

1958 Pt. no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
2071		2.4	1.8	103.0	4.23	-10.1	4.40	5
2072		2.0	3.0	101.0	0.97	-14.5	0.99	1
2073		2.4	2.2	104.7	4.12	-17.6	4.35	5
2074	25	1.6	1.6	106.6	4.17	-13.8	4.37	5
2075		2.0	1.8	119.8	3.80	-15.8	4.17	5
2076		1.8	2.0	117.0	3.43	- 9.5	3.70	4
2077		1.0	1.0	119.5	3.86	- 9.9	4.20	5
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4
2079		[illegible]	3.0	113.6	0.47	- 8.2	0.53	1
2080		2.0	3.0	122.6	0.54	-10.2	0.57	1
2081		2.4	2.0	116.0	3.94	- 2.1	4.25	5
2501	19	2.7	2.3	64.9	1.75	15.8	2.27	3
2502		2.0	2.0	73.4	2.25	12.4	2.60	3
2503		2.8	2.8	73.4	2.97	15.6	3.80	5
2504		3.0	3.0	66.4	1.17	23.6	1.53	2
2505		3.0	2.0	73.8	0.23	23.1	0.47	1
2506		2.3	2.3	78.0	3.41	- 0.8	3.69	4
2507		3.0	3.0	78.9	0.96	0.4	0.98	1
2508		1.8	1.8	80.0	3.27	7.2	3.61	4
2509		3.0	2.0	82.5	0.77	15.9	0.88	1
2510	(286)	3.0	3.0	84.7	1.84	0.1	1.92	2
2511		2.0	2.0	85.9	0.97	0.4	0.98	1
2512		2.0	2.0	85.7	2.56	5.9	2.77	3
2513		3.0	3.0	88.9	0.95	2.4	0.97	1

1958 Ft.no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
2514		2.0	2.5	90.2	1.81	7.1	1.90	2
2515		2.0	2.0	91.9	0.90	7.4	0.95	1
2516		2.0	2.0	93.2	1.76	9.1	1.88	2
2517	23	2.0	2.0	99.0	3.71	11.9	4.12	5
2518		3.0	3.0	93.5	0.82	14.9	0.91	1
2519		2.8	3.0	90.3	2.84	21.0	3.37	4
2520		3.0	3.0	91.5	0.15	47.9	0.39	1
2521	(211)?	3.0	3.0	59.5	0.20	46.9	0.44	1
2522		3.0	2.5	56.9	0.28	50.7	0.75	2
2523		3.0	1.5	56.0	0.24	52.1	0.70	2
2524		2.8	2.8	86.2	2.11	31.8	2.90	4
2525		2.5	3.0	92.5	1.30	25.3	1.61	2
2526	(123)?	3.0	2.7	77.6	0.73	47.6	1.48	3
2527		3.0	3.0	84.0	0.39	39.3	0.63	1
2528		3.0	2.5	88.7	0.74	42.6	1.21	2
2529		2.8	2.8	92.4	1.93	35.2	2.78	4
2530	197?	2.5	2.5	88.3	1.07	48.3	2.07	4
2531		3.0	2.0	87.5	0.58	53.2	1.32	3
2532		3.0	3.0	97.0	1.09	48.2	2.09	4
2533		2.7	2.7	95.1	0.98	44.9	1.71	3
2534		3.0	3.0	97.2	1.00	34.7	1.42	2
2535		3.0	2.0	106.4	2.14	31.5	2.92	4
2536		3.0	2.5	106.5	2.41	27.2	3.10	4
2537		2.8	2.3	106.7	2.61	24.0	3.23	4
2538		2.3	3.0	105.8	2.10	22.6	2.51	3

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
2539		2.3	2.3	100.5	2.10	22.9	2.51	3
2540		2.5	2.3	101.9	3.06	17.3	3.50	4
2541		3.0	3.0	107.5	0.73	18.9	0.85	1
2542		2.0	2.8	106.2	3.19	13.7	3.57	4
2543		2.8	2.0	109.8	3.24	10.9	3.60	4
2544		3.0	2.7	110.2	2.64	7.6	2.81	3
2545		3.0	3.0	106.5	4.07	0.7	4.32	5
2546		2.5	2.5	114.5	1.84	2.9	1.92	2
2547		3.0	3.0	119.0	0.88	8.5	0.94	1
2548	92	2.2	2.2	121.2	3.19	15.2	4.07	6
2549		2.0	2.0	122.6	0.48	13.8	0.54	1
2550		2.5	2.5	116.0	2.81	16.4	3.35	4
2551		3.0	3.0	126.6	0.47	18.8	0.53	1
2552		2.8	2.8	115.2	2.21	27.6	2.97	4
2553		3.0	3.0	113.7	2.10	30.2	2.89	4
2554		2.0	3.0	113.6	0.97	35.4	1.39	3
2555	127?	3.0	3.0	118.6	0.90	36.4	1.34	2
2556		2.8	3.0	111.6	1.03	48.0	2.03	4
2557	27	2.0	2.0	123.7	0.89	47.9	1.88	4
2558		3.0	1.7	129.0	0.31	56.5	0.95	3
2559		3.0	3.0	101.9	0.80	10.4	0.89	1
2560		2.3	2.3	95.8	2.64	8.9	2.81	3
3001	267	2.6	3.0	126.1	3.56	- 8.6	4.02	5
3002		3.0	3.0	130.0	0.74	- 9.7	0.86	1

1958 Pt. no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
3003		2.7	2.7	128.4	2.15	-13.4	2.36	3
3004		2.3	3.0	128.1	2.12	-16.9	2.50	3
3005		2.0	2.0	116.6	0.48	-16.2	0.54	1
3006		2.0	1.8	126.6	2.74	-24.7	3.29	4
3007	29	2.0	2.0	123.0	3.53	-25.6	4.28	6
3008	129	2.2	2.5	121.4	3.48	-27.9	4.19	6
3009	(198)?	2.0	2.0	122.1	4.27	-30.8	3.83	5
3010		2.5	2.5	123.9	2.55	-28.8	3.01	4
3011	168	2.0	2.0	126.6	3.12	-28.5	3.77	5
3012	268?	2.0	2.0	128.3	2.45	-27.3	2.95	4
3013		2.0	2.0	131.0	0.75	-22.8	0.97	2
3014		2.0	2.0	131.9	2.38	-26.4	3.06	4
3015		2.2	2.6	131.9	2.51	-28.6	3.41	5
3016		2.8	2.5	130.0	1.15	-55.5	2.02	4
3017		2.0	2.0	128.0	0.43	-51.7	0.66	1
3018		2.0	2.0	125.0	0.50	-48.7	0.71	1
3019		2.0	3.0	124.0	0.58	-43.7	0.76	1
3020		2.0	2.7	129.6	1.42	-45.1	1.92	3
3021		2.0	2.0	124.0	0.64	-38.7	0.80	1
3022		2.0	2.0	128.0	0.61	-37.7	0.78	1
3023	(9[illegible])	3.0	2.0	133.1	1.61	-38.3	2.04	3
3024	159	2.9	2.0	138.2	3.82	-30.5	5.93	11
3025		3.0	3.0	135.6	0.51	-27.2	0.56	1
3026		2.8	2.5	138.3	2.50	-10.7	2.98	4

1958 Pt.no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
3027		3.0	3.0	138.8	1.25	- 4.8	1.58	2
3028		2.7	2.0	149.4	1.49	- 7.4	1.93	3
3029	255?	3.0	3.0	156.1	1.21	- 2.2	1.70	3
3030		3.0	3.0	156.6	0.75	- 7.6	1.22	2
3031		3.0	2.0	159.2	0.76	- 8.4	1.05	2
3032		3.0	3.0	163.1	0.97	- 8.6	1.49	3
3033		3.0	3.0	152.6	0.53	-21.2	0.57	1
3034	30	2.0	1.9	150.1	2.77	-22.1	4.08	7
3035		2.0	2.0	142.0	0.66	-24.5	0.81	1
3036		2.5	2.0	145.6	0.91	-30.6	1.12	2
3037		2.0	2.0	155.1	1.81	-21.2	2.46	4
3038	(93)	2.9	1.9	145.5	2.37	-37.6	4.17	8
3039	208	2.8	2.5	147.3	1.64	-36.2	2.34	4
3040		2.7	2.3	154.1	2.18	-35.1	3.36	6
3041	202	2.5	2.0	159.1	0.32	-39.9	0.80	2
3042	202	2.5	2.0	158.4	0.30	-40.4	0.77	2
3043	202	2.0	2.0	145.0	0.36	-40.7	0.60	1
3044		3.0	2.0	146.6	1.55	-53.3	2.82	6
3045	(94)	2.3	2.5	168.8	0.82	-49.9	1.54	4
3046	94	2.6	2.4	162.6	1.82	-48.2	2.82	5
3047	161	2.3	3.0	168.6	1.04	-43.2	1.77	4
3048		2.2	2.2	169.9	2.90	-36.6	3.85	6
3049	179	2.2	2.7	163.1	3.34	-36.9	4.85	9
3050	133	3.0	2.0	185.8	5.56	-34.1	6.75	11
3051		2.2	2.0	180.6	4.61	-20.5	4.98	6

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
3052		2.0	2.0	175.3	0.67	-20.3	0.89	2
3053	180	2.5	2.5	177.7	0.43	-25.8	0.76	2
3054	37	2.2	2.1	176.0	5.20	-19.3	6.02	9
3055		2.8	2.2	152.4	2.50	-27.4	3.61	6
3056		2.8	3.0	157.5	1.66	-26.4	2.33	4
3057		2.0	2.0	156.6	0.50	-23.2	0.55	1
3058		2.4	2.0	162.6	1.77	-20.5	2.65	5
3059	34	1.6	1.7	168.1	5.37	-13.9	7.05	12
3060	35?	2.5	2.5	171.3	1.13	- 9.6	1.26	2
3061		2.5	2.0	182.3	1.11	- 9.6	1.23	2
3501		3.0	3.0	126.6	0.52	10.8	0 56	1
3502		2.4	2.8	126.1	2.96	15.6	3.67	5
3503		3.0	3.0	130.0	0.72	- 1.7	0.85	1
3504		2.7	2.7	129.1	0.84	41.3	1.57	3
3505		2.5	2.5	136.7	0.59	50.1	1.52	4
3506		2.7	2.0	133.9	1.84	13.4	2.18	3
3507	270?	3.0	3.0	130.8	1.42	9.9	1.69	2
3508		1.5	2.5	138.9	1.18	11.9	1.54	2
3509		3.0	1.5	143.2	1.09	9.4	1.47	2
3510		2.0	2.0	147.6	0.18	50.8	0.33	1
3511		3.0	2.0	147.6	0.15	53.8	0.30	1
3512	130	3.0	3.0	152.5	0.34	47.5	0.69	2
3513		3.0	2.0	165.6	0.31	50.7	0.66	2
3514	250	2.3	2.0	161.5	0.62	45.0	1.22	3
3515		3.0	2.0	165.3	0.47	41.7	0.82	2

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
3516		2.5	3.0	171.4	0.37	46.9	0.72	2
3517		2.0	3.0	175.0	0.27	43.2	0.47	1
3518		3.0	2.0	185.6	0.08	53.8	0.22	1
3519	36	2.5	2.0	182.0	1.33	45.0	2.51	8
3520		3.0	2.0	181.6	0.13	45.8	0.28	1
3521		2.5	2.5	186.1	0.69	41.1	1.12	2
3522	234?	3.0	3.0	180.9	3.20	2.0	3.57	5
4001		2.4	2.2	177.6	1.68	-22.9	2.42	5
4002		2.4	2.0	186.3	7.05	-17.8	7.96	12
4003		2.7	2.0	191.4	7.42	-20.9	8.41	12
4004		2.2	2.0	192.5	7.83	-17.1	8.68	13
4005	164	2.0	2.0	193.0	0.79	-14.8	0.80	1
4006	44	1.8	1.9	194.3	8.70	-12.8	9.83	15
4007		2.0	3.0	202.6	0.13	-16.2	0.28	1
4008		2.0	2.0	200.0	0.78	- 6.8	0.79	1
4009		2.3	2.3	197.3	1.72	-15.4	1.85	3
4010		2.5	2.1	198.0	6.50	-19.7	7.36	11
4011		2.1	2.2	199.6	8.30	-23.0	9.27	14
4012		2.9	1.9	190.4	7.40	-29.2	9.03	15
4013	162	3.0	2.1	182.9	3.34	-53.0	5.17	10
4014	40	2.7	2.7	197.6	1.04	-55.4	1.44	3
4015	235	2.6	2.4	202.0	5.27	-50.5	7.55	14
4016	42	2.6	2.1	200.6	7.46	-37.4	9.29	15
4017		2.6	2.3	217.8	4.65	-33.3	5.61	8
4018		2.9	1.9	203.9	4.86	-21.3	5.21	7

1958 Pt.no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
4019		1.5	1.5	204.5	1.71	-16.1	1.75	2
4020	(167)	2.0	2.0	206.5	1.70	-17.5	1.84	3
4021	(167)	2.0	2.0	209.9	0.60	-18.6	0.60	1
4022		3.0	3.0	205.3	1.53	- 1.5	1.57	2
4023		2.0	2.0	207.7	10.30	-14.8	11.33	16
4024		2.4	2.4	213.9	10.68	-12.3	11.56	16
4025		2.9	2.8	220.2	7.07	- 9.0	7.60	10
4026	168	3.0	1.9	216.6	4.40	-52.8	6.47	12
4027	46	3.0	3.0	227.9	0.82	-31.2	0.90	1
4028	50	2.7	2.3	227.1	8.44	-34.1	10.81	17
4029	52	2.1	2.2	236.0	9.50	-38.3	12.48	21
4030	257	2.3	2.3	236.1	7.06	-49.7	10.51	20
4031		2.3	2.1	236.9	3.33	-54.2	5.13	10
4032		3.0	2.3	227.1	4.07	- 9.3	4.50	6
4033		2.8	2.8	228.7	7.81	- 4.4	8.78	12
4034		3.0	3.0	227.5	0.82	- 1.9	0.91	1
4035		2.2	2.1	235.4	10.94	0.7	12.45	18
4036	(258)	2.0	2.0	237.3	5.03	- 3.5	5.81	9
4037	(189)	2.5	2.0	238.5	0.93	- 4.4	0.97	2
4038	194	2.0	2.0	232.2	2.14	-10.5	2.26	3
4039		2.5	2.5	233.2	1.35	-15.4	1.55	2
4040	167	3.0	1.8	204.4	3.54	-18.4	3.99	6
4501		3.0	3.0	191.0	0.49	29.2	0.63	1
4502		2.0	2.0	188.0	0.70	11.2	0.75	1
4503		2.0	2.0	187.5	1.04	13.3	1.21	2
4504	203	1.8	1.7	191.5	5.75	14.0	6.87	11

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
4505		3.0	3.0	197.4	1.16	9.4	1.27	2
4506	43	1.5	1.3	196.4	7.88	14.9	10.01	17
4507	210	3.0	2.0	197.3	1.04	16.0	1.20	2
4508		2.0	2.3	198.6	1.62	21.6	1.97	3
4509		2.8	2.8	197.4	2.71	27.4	3.45	5
4510	45	3.0	3.0	199.9	2.64	36.6	3.98	7
4511		2.0	2.0	205.0	0.72	19.2	0.85	1
4512	211	2.0	1.8	201.1	6.00	13.9	7.01	11
4513		1.5	1.5	205.3	1.20	13.2	1.46	2
4514		2.1	1.9	201.3	4.22	10.7	4.68	7
4515	193	2.0	1.5	205.2	6.12	10.8	6.89	11
4516		3.0	3.0	206.0	0.71	4.2	0.76	1
4517	47	2.1	1.9	217.6	9.67	8.5	11.02	16
4518		3.0	3.0	212.8	0.35	21.1	0.46	1
4519		2.3	3.0	226.4	2.65	19.7	3.33	6
4520	(53,138)	2.5	3.0	226.0	3.27	21.5	4.10	6
4521		2.0	3.0	230.2	0.89	29.4	1.40	3
4522		2.5	2.5	220.4	3.01	38.0	4.65	8
4523	51	3.0	3.0	228.4	0.44	42.2	0.93	3
4524		3.0	3.0	224.5	0.82	4.1	0.91	1
4525		2.5	2.0	228.3	1.19	17.0	1.46	2
4526	(95)	1.8	1.8	238.1	11.15	6.6	13.29	20
5001	212	2.3	2.2	248.5	5.47	-32.7	6.83	11
5002	54?	2.0	2.5	242.7	1.26	-15.4	1.42	2
5003	278?	2.5	2.5	240.6	1.37	- 5.7	1.57	2

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
5004	(55)	2.0	2.3	245.2	1.03	- 3.2	1.20	3
5005	(57)	1.0	1.0	245.7	0.65	+ 2.5	0.72	1
5006		2.3	2.0	250.5	2.41	- 4.1	2.50	3
5007	182	3.0	2.0	252.3	0.69	-12.4	0.74	1
5008		3.0	3.0	246.7	0.65	-15.5	0.72	1
5009		3.0	2.8	252.1	4.33	-20.0	4.74	6
5010	171	2.9	2.4	260.6	9.66	-24.9	11.47	18
[illegible]		[illegible]	[illegible]	[illegible]	2.07	[illegible]	3.43	7
5013	60	1.9	2.8	265.4	4.92	-40.8	6.81	13
5014		2.0	2.2	265.2	2.63	-41.8	3.45	6
5015		2.0	2.0	273.0	0.24	-37.7	0.44	1
5016	172	2.6	2.7	269.1	8.21	-29.9	10.18	17
5017	(237)	2.5	2.5	258.8	1.74	-19.9	2.38	4
5018		3.0	3.0	267.2	3.52	-15.3	3.75	5
5019		2.8	2.1	262.3	5.65	- 4.6	6.32	9
5020	58	2.1	2.1	256.5	7.25	+ 0.1	8.37	13
5021		2.6	2.4	275.9	6.32	- 4.4	6.72	9
5022		2.0	2.5	278.8	3.73	1.4	4.11	6
5023	143	1.7	2.3	280.2	1.51	- 0.3	1.64	3
5024	105	2.2	2.1	286.5	7.97	- 1.4	0.19	14
5025	(72)	2.2	2.1	292.9	7.07	+ 1.9	8.29	13
5026		3.0	2.4	277.2	3.56	-12.6	3.86	5
5027		3.0	2.8	283.5	3.11	-12.2	3.33	5
5028	102	3.0	3.0	286.7	4.46	-17.1	5.45	8
5029		3.0	3.0	287.2	2.86	-19.1	3.10	4

1958 Pt. no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
5030	70	2.9	1.6	298.0	6.90	-24.6	9.11	17
5031	294	2.2	2.2	286.9	6.77	-28.8	8.15	13
5032		3.0	2.0	270.9	0.47	-32.1	0.61	1
5033	98	2.1	2.9	272.5	6.39	-42.3	8.79	16
5034		2.7	2.3	278.7	1.53	-49.1	2.06	3
5035	101	1.4	1.4	294.3	3.79	-43.1	5.17	10
5036	68	2.0	2.0	295.2	0.67	-38.3	0.82	1
5037		[illegible]	1.5	306.1	0.95	-37.1	1.28	2
5038		2.8	2.8	308.2	1.20	-54.7	2.11	4
5039		3.0	2.0	304.4	0.22	-55.8	0.36	1
5040	99	3.0	2.7	301.5	0.45	-59.5	1.01	3
5041		2.8	1.9	289.9	2.46	-59.1	4.42	10
5042		2.8	2.3	284.3	0.63	-51.4	1.32	4
5043		2.4	2.8	280.1	1.70	- 5.2	2.40	5
5044	55	2.5	2.5	250.6	0.51	- 1.8	0.95	2
5501		2.0	2.0	243.5	0.56	2.1	0.75	1
5502		2.0	2.5	250.4	2.08	7.7	2.91	6
5503		2.4	2.3	247.2	2.34	12.4	3.36	7
5504		2.0	2.1	240.7	9.12	13.0	11.38	18
5505		2.0	2.6	237.6	1.97	17.3	2.51	5
5506		1.9	2.0	242.5	8.17	18.7	10.55	18
5507		2.0	2.8	240.7	1.74	26.0	2.28	4
5508		2.0	3.0	238.0	1.85	34.3	2.84	6
5509	300	2.2	2.6	242.6	1.76	34.0	2.65	5
5510		2.3	3.0	242.2	0.85	39.4	1.54	3

1958 Pt. no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
5511		3.0	2.0	242.9	0.20	48.5	0.40	1
5512		2.5	3.0	241.3	1.04	45.3	1.81	4
5513		2.0	3.0	247.2	0.52	34.2	0.72	1
5514		2.0	3.0	248.8	0.48	31.7	0.62	1
5515		3.0	3.0	241.6	0.13	24.0	0.16	1
5516		2.5	2.4	249.9	3.97	17.9	5.08	8
5517		1.5	2.0	250.7	0.64	17.0	0.80	2
5518		2.5	2.0	257.8	1.05	16.5	1.29	2
5519	96	1.9	1.9	253.9	3.78	19.7	4.51	7
5520	(96)	2.5	2.8	252.8	2.69	21.7	3.50	6
5521		3.0	3.0	256.7	0.35	28.5	0.53	1
5522		2.0	3.0	254.9	0.48	27.5	0.62	1
5523	140	2.0	1.0	260.9	0.44	29.9	0.59	1
5524	59	2.0	2.4	252.2	3.50	35.4	5.35	10
5525		3.0	2.7	261.1	0.59	45.5	1.18	3
5526		2.3	2.7	259.9	0.67	38.4	1.21	3
5527		2.0	3.0	256.2	1.43	27.8	2.03	4
5528		3.0	3.0	252.6	0.13	22.0	0.16	1
5529		3.0	3.0	258.8	2.17	16.7	2.84	5
5530		3.0	3.0	257.9	2.00	13.1	2.28	3
5531		1.9	2.1	261.4	4.32	5.8	4.98	8
5532		1.8	2.4	260.9	3.21	9.3	3.66	5
5533	97	2.8	2.7	263.6	5.82	10.9	6.91	11
5534		2.4	1.5	262.0	1.20	12.9	1.39	2

1958 Pt. no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
5535	63,279	2.3	1.9	269.4	4.68	7.1	5.49	9
5536		2.0	2.0	273.7	0.68	11.2	0.82	2
5537	(107)	2.1	1.8	277.3	5.32	3.9	6.10	10
5538	107	2.2	2.4	280.3	3.84	5.2	4.90	9
5539	103	1.3	1.5	278.0	5.71	7.7	6.66	10
5540		2.0	2.3	279.2	1.50	11.6	1.65	3
5541		2.0	3.0	[illegible]	0.43	14.6	0.59	[illegible]
5542		2.0	2.0	275.0	0.74	20.0	0.86	1
5543	108	2.0	2.0	276.0	0.70	23.0	0.84	1
5544		1.0	1.0	274.0	0.55	24.9	0.66	1
5545		2.1	1.9	274.2	6.15	24.9	8.35	15
5546		2.0	1.0	276.0	0.54	26.9	0.66	1
5547	242?	2.3	2.9	267.7	2.78	33.3	3.94	8
5548		3.0	2.0	260.4	0.31	45.9	0.55	2
5549		2.3	2.0	274.9	0.66	42.9	1.09	3
5550	214?	2.4	1.8	272.5	2.15	44.9	3.97	10
5551		3.0	2.0	275.6	0.03	48.0	0.08	1
5552	71	1.8	1.5	288.9	1.28	47.7	2.37	6
5553		2.4	2.6	292.1	1.72	34.5	2.54	5
5554	307	2.0	2.0	277.0	0.66	26.0	0.81	1
5555	(67)	2.0	2.0	279.0	0.68	25.0	0.82	1
5556	69	2.1	2.1	286.2	6.02	22.6	8.17	15
5557		1.0	1.0	282.0	0.66	26.0	0.81	1
5558		2.0	2.0	281.0	0.69	24.0	0.83	1

1958 Pt.no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
5559		1.0	1.0	290.7	0.47	19.6	0.62	1
5560		2.8	3.0	286.4	2.14	17.7	2.45	4
5561		2.5	2.8	289.2	2.73	15.8	3.21	6
5563	106	1.7	2.8	292.8	6.29	8.5	7.89	14
5564		3.0	3.0	254.0	0.20	12.2	0.45	1
5565		1.6	1.7	249.8	4.57	5.1	5.29	7
6001		2.0	2.0	294.0	0.95	-12.0	0.98	1
6002		2.8	2.8	294.3	5.01	- 8.4	5.45	8
6003	(201)	1.0	1.0	299.0	1.67	- 1.9	1.73	2
6004	245	2.2	2.3	303.7	6.81	- 1.1	8.57	14
6005		2.1	2.8	305.7	6.57	-18.4	8.37	14
6006		3.0	3.0	307.7	0.62	-24.7	0.79	1
6007	(173)	3.0	2.0	311.9	0.14	-25.5	0.34	1
6008	(109)	2.4	2.4	310.9	3.82	-25.6	4.73	8
6009		1.4	1.9	317.8	3.68	-40.0	5.03	9
6010	243?	2.0	2.4	312.8	1.74	-36.3	2.69	5
6011		2.0	3.0	314.5	1.00	-43.9	1.40	2
6013		3.0	2.7	329.4	0.47	-53.0	1.01	3
6014		3.0	3.0	329.0	0.31	-45.0	0.55	1
6015		3.0	3.0	350.0	0.09	-46.0	0.30	1
6016		3.0	2.0	344.0	0.17	-43.1	0.37	1
6017	111	2.8	2.2	320.1	2.69	-26.7	3.48	6
6018		3.0	2.0	323.4	0.82	-25.1	1.41	3
6019		2.7	2.0	335.2	1.32	-26.1	1.70	3
6020	147	2.5	2.5	332.5	1.16	-22.5	1.52	2

1958 Pt. no.	Master List	Q_λ	Q_φ	$\bar{\lambda}$	W_λ	$\bar{\varphi}$	W_φ	n
6021	186	2.5	2.0	335.5	1.28	-19.5	1.59	2
6022		3.0	1.0	332.7	1.59	-18.8	1.69	2
6023	112	2.5	2.5	320.0	5.75	-17.0	7.47	13
6024	174	2.1	2.1	307.3	6.73	-12.8	8.78	16
6025		3.0	2.0	317.6	0.48	-10.2	0.69	1
6026		2.8	1.8	320.8	2.16	-10.0	2.73	4
6027	175	2.4	1.4	328.7	2.33	- 6.7	2.95	5
6028	176	2.4	1.4	333.5	3.19	- 5.9	3.84	5
6029		3.0	1.7	334.8	1.61	-12.8	2.11	3
6030	265	1.8	1.5	342.1	2.27	- 5.5	2.60	4
6031		3.0	2.0	347.5	1.65	-13.1	1.82	2
6032		1.7	1.6	345.0	4.08	- 6.5	4.71	7
6033	114	2.3	1.5	348.8	3.96	- 7.7	4.54	6
6034		1.3	1.8	351.5	3.43	- 7.0	4.14	6
6035	149	1.2	2.0	351.9	3.21	- 2.4	3.65	5
6036		1.0	1.0	354.7	0.49	0.6	0.62	1
6037	191	1.6	2.0	354.7	2.76	- 4.9	3.10	5
6038	(116)	2.6	1.8	356.0	3.97	-10.8	4.77	8
6039	248	3.0	2.0	350.9	0.94	-28.6	1.05	2
6040	247	3.0	2.5	347.0	0.57	-53.2	0.82	2
6501	291?	2.0	1.5	316.7	0.53	47.2	0.98	2
6502		3.0	2.0	319.6	0.10	53.8	0.31	1
6503	79	2.8	2.3	323.0	1.24	47.5	2.76	8
6504	292?	1.0	1.0	325.8	0.55	46.1	0.99	2
6505		3.0	2.0	330.6	0.44	41.8	0.94	2

1958 Pt. no.	Master List	Q_λ	Q_φ	$\overline{\lambda}$	W_λ	$\overline{\varphi}$	W_φ	n
6506		3.0	3.0	342.5	0.93	27.5	1.36	2
6507		2.5	3.0	351.6	1.11	26.1	1.49	2
6508	150?	2.8	2.0	353.7	1.08	41.8	2.02	4
6509	85	1.3	1.5	352.0	3.85	3.2	4.76	8

Table 3

DATA FOR 32 OBSERVATIONS OF MARS AT FLAGSTAFF IN 1958

No.	Date	UT	ω	Ap(in)	Magn.	I	d	D_o	η	i
1	Oct 4	7:46	316°	18	350	3	16"2	-8°4	28°9	-33°4
2	4	10:14	352°	15	350	3	-	-	-	-
3	11	6:58	240°	18	310	3	17"0	-8°5	33°0	-30°0
4	11	10:12	288°	21-24	550	2	-	-	-	-
5	11	12:28	320°	21	550	2	-	-	-	-
6	12	9:48	272°	21	550	3	17"2	-8°6	33°7	-28°9
7	12	11:48	302°	21	550	2	-	-	-	-
8	13	6:48	220°	21	550	2	17"3	-8°6	34°2	-28°1
9	13	10:49	278°	21-24	550	2	-	-	-	-
10	14	9:13	246°	21	550	3	17"4	-8°7	34°8	-27°7
11	14	11:03	272°	18	550	3	-	-	-	-
12	15	6:15	194°	15-18	310,550	3	17"5	-8°7	35°4	-27°0
13	15	9:13	237°	18	310	3	-	-	-	-
14	15	12:48	289°	15-21	310	4	-	-	-	-
15	16	10:53	252°	18	310	3	17"6	-8°8	36°0	-26°3
16	17	9:53	228°	12-18	310	5	17"7	-8°9	36°5	-25°6
17	18	7:33	186°	18	310	4	17"8	-9°0	37°1	-25°3
18	18	9:58	220°	24	550	3	-	-	-	-
19	18	12:08	252°	21	310	4	-	-	-	-
20	19	9:28	204°	21	310,550	3	17"9	-9°0	37°7	-24°3
21	19	12:03	242°	21	310;550	4	-	-	-	-
22	20	9:28	195°	18	310	4	18"0	-9°2	38°3	-23°6
23	22	6:53	140°	21	310	3	18"3	-9°4	39°4	-22°1
24	22	10:28	192°	21	310	3	-	-	-	-
25	23	5:24	109°	21-24	310,550	2	18"4	-9°5	40°0	-21°3
26	24	5:28	101°	21	310,550	2	18"5	-9°6	40°5	-20°6
27	26	6:13	94°	21-24	310	3	18"6	-9°9	41°7	-19°0
28	Oct 27	6:03	82°	24	310	3	18"7	-9°9	42°3	-18°2
29	Nov 4	5:35	5°	21	310	3	19"1	-11°3	46°7	-11°4
30	7	8:23	20°	21	310	3	19"2	-11°8	48°5	-8°7
31	22	6:48	224°	18-24	310,550	3	18"6	-14°6	56°8	+5°0
32	23	6:28	210°	24	310,550	3	18"5	-14°8	57°3	+5°9

Table 4

SYSTEMATIC AND ACCIDENTAL ERRORS OF AREOGRAPHIC COORDINATES MEASURED ON 32 DRAWINGS OF MARS IN 1958 (*)

No.	r_λ	r_φ	w_2	σ_λ	σ_ϕ	Σw_λ	Σw_φ	n_2	n_1
1	-0°.4	+0°.5	1.0	3°.89	2°.18	113.16	145.13	26	45
2	-2°.0	+2°.2	0.8	5.20	3.36	115.99	148.93	36	46
3	+1°.1	-2°.0	0.8	4.84	2.48	304.94	376.43	52	63
4	-3°.2	-2°.9	0.8	3.34	2.20	244.11	307.92	57	79
5	+2°.5	+2°.6	0.8	3.19	2.79	165.78	207.43	40	54
6	-2°.6	+2°.4	0.8	2.92	2.81	264.98	333.85	51	60
7	+3°.8	+3°.0	0.2	4.71	3.67	182.75	229.60	45	62
8	-3°.6	-0°.8	0.8	4.92	2.46	337.40	414.89	60	73
9	-4°.3	+1°.0	1.0	2.67	2.26	291.49	369.41	64	83
10	-2°.9	+2°.5	0.8	3.58	3.25	400.17	439.70	71	96
11	-2°.0	-1°.2	1.0	3.70	2.84	287.44	362.70	59	76
12	-0°.8	-1°.2	1.0	3.62	2.56	283.86	349.40	49	75
13	+0°.5	-1°.9	1.0	4.53	2.10	398.29	490.36	68	92
14	+5°.9	-2°.4	0.6	3.01	2.28	218.83	281.78	43	52
15	-0°.8	+0°.7	1.0	2.96	2.20	273.43	348.12	45	69
16	-5°.8	+1°.4	0.6	4.28	2.41	191.25	237.56	28	52
17	+3°.8	-0°.2	0.8	4.98	2.06	265.23	324.09	45	63
18	-1°.9	-1°.5	0.8	4.68	2.26	281.94	349.10	48	84
19	-0°.9	-1°.9	0.8	5.36	2.72	262.37	330.96	46	81
20	+0°.1	+1°.0	1.0	2.55	2.11	326.75	404.48	60	91
21	+2°.8	+2°.1	0.2	5.64	3.40	348.79	428.52	60	102
22	+1°.7	+1°.8	1.0	3.61	2.18	295.75	369.58	55	81
23	-1°.6	-3°.6	0.6	6.24	3.27	232.17	283.06	67	113
24	-0°.5	-0°.5	0.8	3.02	3.11	299.23	371.31	58	106
25	-0°.5	-0°.3	1.0	2.74	1.55	341.44	419.24	124	161
26	+1°.4	+0°.8	1.0	2.49	1.82	359.87	442.06	130	182
27	-1°.0	+0°.2	1.0	2.38	2.08	359.28	440.47	131	173
28	-1°.0	-0°.3	1.0	2.62	1.49	327.25	399.83	116	167
29	+1°.8	-1°.1	1.0	4.31	1.73	160.05	206.51	54	104
30	+0°.8	-0°.2	1.0	4.04	2.14	176.57	225.20	63	143
31	+1°.8	+2°.6	0.6	4.23	2.41	315.40	392.91	63	81
32	+2°.8	+2°.3	0.6	5.13	2.16	325.99	404.74	67	95

(*) Successive columns are:

Mean systematic residuals r_λ, r_ϕ from first approximation
before phase and drawing corrections.

Drawing relative weight w_2.

Standard deviations σ_λ, σ_ϕ for unit weight $w = w_1 w_2$ in
second approximation after phase and drawing corrections.

Sums of weights Σw for all points on drawing.

Total number of points on drawing measured at least twice (n_2).

Total number of points on drawing (n_1).

Table 5

STANDARD ERRORS OF AREOGRAPHIC COORDINATES

AS A FUNCTION OF IMAGE QUALITY

I	σ_λ	σ_φ	Σw_λ	Σw_φ	n
2.0	3.44	2.49	934.09	1164.19	266
2.5	3.84	2.30	1579.73	1964.94	372
3.0	3.87	2.35	2368.37	2939.35	596
3.5	4.19	2.72	2571.29	3209.16	524
4.0	4.23	2.49	841.98	1049.95	150
4.5	4.98	2.06	265.23	324.09	45
5.5	4.28	2.41	191.25	237.56	28

Table 6

STANDARD ERRORS OF AREOGRAPHIC COORDINATES

AS A FUNCTION OF POINT DEFINITION

$\bar{Q}$	σ_λ	σ_φ	Σw_λ	Σw_φ	n_λ	n_φ
1.0-1.5	3.44	3.08	251.58	541.94	64	142
1.5-2.0	3.45	2.47	1185.51	2446.25	203	398
2.0-2.5	3.87	2.46	3372.62	5912.75	662	996
2.5-3.0	4.33	2.52	3704.16	2226.33	958	539

Table 7

STANDARD ERRORS OF AREOGRAPHIC COORDINATES

AS A FUNCTION OF LATITUDE

φ	σ_λ	σ_φ	Σw_λ	Σw_φ	n
(+60)-(+50)	6.91	3.02	7.40	17.47	11
(+50)-(+40)	8.56	3.46	104.91	193.92	82
(+40)-(+30)	4.99	2.95	142.79	213.09	66
(+30)-(+20)	4.27	2.91	403.29	530.36	104
(+20)-(+10)	3.63	2.76	960.85	1170.89	190
(+10)-(+ 0)	2.79	2.28	1178.08	1385.20	199
(0)-(-10)	2.58	1.84	1229.80	1410.10	282
(-10)-(-20)	3.02	1.71	1581.28	1838.54	303
(-20)-(-30)	4.12	2.32	1365.58	1654.90	295
(-30)-(-40)	4.95	2.46	998.69	1289.67	201
(-40)-(-50)	4.95	3.50	495.87	690.06	122
(-50)-(-60)	6.50	3.54	260.02	400.36	91
(-60)-(-70)	8.18	5.97	16.77	28.59	7

Table 8

EXAMPLE OF OUTPUT FOR POINT NO. 2001 = ML 20 = JUVENTAE FONS

Point 2001	$\bar{Q}_\lambda = 1.2$	$\bar{\lambda}_w = 62\overset{\circ}{.}5$	$\Sigma w_\lambda = 3.50$
	$\bar{Q}_\varphi = 1.0$	$\bar{\varphi}_w = -3\overset{\circ}{.}6$	$\Sigma w_\varphi = 4.51$

λ	δQ_λ	δ_λ	W_λ	φ	δQ_φ	δ_φ	W_φ	Dr.
62.0	-.2	-.5	.48	-4.5	.0	-.9	.70	25
62.0	-.2	-.5	.62	-2.7	.0	.9	.79	26
60.5	-.2	-2.1	.73	-3.1	.0	.5	.85	27
62.9	-.2	.4	.88	-5.6	.0	-2.0	.94	28
68.6	.8	6.1	.27	-3.2	.0	.4	.52	29
62.8	-.2	.2	.51	-1.9	.0	1.7	.71	30

$\sigma(Q_\lambda) = .41$ $\sigma(Q_\phi) = .00$ $\sigma_\lambda = 1\overset{\circ}{.}98$ $\sigma_\phi = 1\overset{\circ}{.}29$

$\varepsilon_\lambda = 0\overset{\circ}{.}71$ $\varepsilon_\phi = 0\overset{\circ}{.}41$

The entries are as follows:

1st. line: Mean value of point definition Q_λ; weighted mean λ; sum of weights in λ

2nd line: Mean value of point definition Q_φ; weighted mean ϕ; sum of weights in ϕ

Successive columns give: longitude corrected for phase effect and drawing error in λ, residual of Q_λ, residual of λ, weight $w_1 w_2$ in λ; latitude corrected for drawing error in ϕ, residual of Q_ϕ, residual of ϕ, weight $w_1 w_2$ in ϕ; drawing number.

Last two lines give: standard error of Q_λ, standard error of Q_ϕ; standard error of λ, standard error of ϕ (both for unit weight) probable error of mean λ, probable error of mean ϕ.

Table 9

DATA FOR TRANSIT OBSERVATIONS 1939, 1941, 1958. (*)

(1) Year	(2) Date	(3) N_1	(4) N_2.	(5) I	(6) $\delta\lambda$	(7) ΔA
1939	July 26	15	8	4 - 5.5	0	+ 0°6
-	July 27	8	5	4 - 5	0	+ 1.4
-	Aug 8	6	1	3	0	+11.4
1941	July 17	11	9	1.7 - 3.0	- 1°0	-48.2
-	Aug 11	5	1	4.3	0	-42.3
-	Sept 22	22	8	2.5 - 4	- 1.0	-17.2
-	Sept 23	13	12	2.5 - 3.0	- 1.0	-16.3
-	Oct 5	7	4	3.0	+ 1.0	- 5.0
-	Oct 6	9	3	3.3 - 3.7	- 0.9	- 4.0
-	Oct 9	5	6	4.0 - 4.5	0	- 1.1
-	Oct 10	3	3	2.5	0	- 0.1
-	Nov 13 to 17	12	13	4.0	- 0.9	+28.2
1958	Oct 20	1	2	4.5	0	-22.6
-	Oct 23	15	3	2 - 2.5	0	-20.4
-	Oct 26	4	1	3	0	-18.2
-	Oct 27	57	4	2.5 - 3.5	0	-17.4
-	Nov 4	11	2	3.5	0	-11.0

(*) N_1 = number of observed times

N_2 = number of derived points

I = image quality

$\delta\lambda$ = reduction to true meridian

ΔA = phase angle in longitude

Table 10. AREOGRAPHIC LONGITUDES FROM MERIDIAN TRANSITS, 1939, 1941, 1958

1958 no.	Date	λ	n	$\bar{\lambda}$	Description	Rem.
1001	41 Sept 22	0°2	15	359°3	South point of	
	- Sept 23	358.4	9		Fastigium Aryn	
	58 Nov 4	358.5	11			
1002	41 July 17	(350.2)	7	358.4	Center Sinus	w=1/4
	- Sept 22	0.2	15		Meridiani	
	- Sept 23	358.5	9			
	58 Nov 4	358.5	11			
1003	41 Sept 22	3.9	15	2.6	Center following horn	
	- Sept 23	1.2	9		of Sinus Meridiani	
1005	41 Sept 22	(6.9)	7	5.1	Following point of	w=1/2
	- Sept 23	4.2	9		Sinus Meridiani	
1006	41 Sept 23	3.8	9			
1009	41 July 17	(354.2)	7			
1010	41 Sept 23	(7.6)	4			
1011	41 Sept 23	(10.4)	4			
1022	39 July 26	(34.6)	10	36.1	Aromatum Promontorium	
1025	39 July 25	37.7	10			
1054	39 July 26	58.0	10	57.5	Mouth of Baetis	
	- July 27	56.9	5			
1056	39 July 26	60.9	10	60.4	Mouth of Coprates	
	- July 27	59.8	5			

1958 no.	Date	λ	n	$\bar{\lambda}$	Description	Rem.
1061	39 July 26	33.7	10		Aromatum Promontorium?	(1)
1502	41 July 17	(351.5)	7		North point of follow-	w=1/4
	- Sept 22	2.1	15	359.8	ing horn of Sinus	
	- Sept 23	359.4	9		Meridiani	
2001	39 July 27	62.2	5		Juventae Fons, center	
2006	39 July 26	70.8	11	72.1	Center of Melas Lacus	
	- July 27	(74.7)	3			w=1/2
2013	39 July 26	85.1	11	87.9	Center of Noctis Lacus	
	- July 27	(93.5)	3			w=1/2
2074	39 July 26	97.6	11		Center of Phoenicis	
	58 Oct 26	106.5	4		Lacus	
3008	58 Oct 23	122.7	4	122.6	Preceding point of	
	- Oct 27	122.6	17		Sirenum Sinus	
3009	41 Aug 11	129.3	5		Following point of Daedalia	w=1/2
3010	58 Oct 27	125.4	19		Center of Sirenum Sinus	
3011	58 Oct 23	126.3	7		Following point of Sirenum Sinus	
3012	58 Oct 27	130.2	19		Center Sirenius Lacus	
3015	58 Oct 23	129.2	4	131.1	Following point of	
	- Oct 27	133.0	2		Sirenius Lacus	
3054	41 Nov 13-18	179.4	7		Following point of Mare Sirenum	
3059	41 Nov 13-18	(171.5)	3		North point of Titanum Sinus	

1958 no.	Date	λ	n	λ	Description	Rem.
4002	41 Oct 9	192.5	5		Preceding point of	
	- Oct 10	(190.5)	2	191.3	Laestrygonum Sinus	w=1/2
	- Nov 13-18	189.7	7			
4003	41 Oct 9	195.5	5			
	- Oct 10	196.2	3	195.5	North point of Rasena	
	- Nov 13-18	194.4	7			w=1/2
4006	41 Oct 9	199.3	5	199.8	North point of	
	- Nov 13-18	200.8	7		Laestrygonum Sinus	w=1/2
4010	41 Oct 9	199.4	5	199.8	Laestrygonum Fretum	
	- Nov 13-18	200.5	7			w=1/2
4012	41 Oct 9	194.6	5			
	- Oct 10	190.5	3	192.7	South point of Rasena	
	- Nov 13-18	193.0	7			w=1/2
	58 Oct 20	192.7	1			w=1/2
4017-27	41 Nov 13-18	(218.7)	2		North point of Eridania	w=1/4
4020	41 Nov 13-18	206.5	7		Mouth of Draconis canal	w=1/2
4023	41 Nov 13-18	213.9	9		Preceding point of Gomer Sinus	w=1/2
4035	41 Oct 6	243.2	2	(241.1)	Center of following lobe	
	- Nov 13-18	232.8	9		of Gomer Sinus	w=1/4
4506	41 Oct 9	(194.0)	3	193.4	Center of Trivium	w=1/2
	58 Oct 20	192.7	1		Charontis	w=1/2
4526	41 Oct 5	(234.0)	3	233.6	North point of Gomer	w=1/2
	- Nov 13-18	(232.9)	5		Sinus	w=1/4

1958 no.	Date	λ	n	$\bar{\lambda}$	Description	Rem.
5005	41 Oct 5	(251.2)	7	247.5	Following point of Cimmerium Sinus	w=1/2
	- Oct 6.	(245.0)	2			w=1/2
	- Nov 13-18	(244.9)	5			w=1/4
5020	41 Oct 5	(259.0)	4		North point of Syrtis Minor	w=1/2
5532	41 Oct 5	(275.5)	4		Nepenthes on Moeris Lacus	w=1/2
6023	41 July 17	(318.5)	4		Preceding point of Deucalionis R.	w=1/4
6024	41 July 17	(314.0)	5		Tip of Hammonis Cornu	w=1/4
6027-28	39 Aug 8	336.:	5		Mid-pt of Sigeus Portus	w=1/2
6030	41 July 17	341.2	11		Preceding pt of Edom	w=1/2
6032	41 Sept 23	(348.5)	4		Edom Promontorium	w=1/2
6035	41 Sept 23	352.8	9		Following pt of Edom	
6036	41 Sept 22	356.1	15		Node in preceding horn of Sinus Meridiani	
6037	41 Sept 22	356.7	15		Center of preceding horn of Sinus Meridiani	
6509	41 July 17	348.0	11	352.9	North p' of preceding horn of Sinus Meridiani	w=1/2
	- Sept 22	(354.8)	7			w=1/2
	- Sept 23	354.3	9			
SAF 60	41 July 17	(317.0)	4		Preceding pt of Sabaeus Sinus	w=1/4

(1) Not consistent with 1022, 1025.